September, 1943

THE FOUNDRY

FIFTY-SECOND YEAR

*a new name to remember . . .*

# CROWN HILL SEACOAL

A new name, a new seacoal, from a brand new plant! Made on the most modern machinery available—from the *best* coal. Crown Hill is a seacoal you'll like and one you'll hear lots more about soon.

THE FEDERAL FOUNDRY SUPPLY COMPANY

4600 East 71st Street • Cleveland 5, Ohio

Seacoal Plant
CROWN HILL, W. VA. • CHICAGO • CHATTANOOGA, TENN. • DETROIT • MILWAUKEE • MINNEAPOLIS • NEW YORK • ST. LOUIS • RICHMOND, VA. • Mines UPTON, WYO.

OFF. U. S. NAVY PHOTO

## BETTER CASTINGS FOR

# War and Peace

YOU can't beat American ingenuity! Producing castings for the armaments of war—faster, better, more accurately—is the specialty of our foundries *today*. *Tomorrow*, Yankee resourcefulness will turn, with equal facility, to the products of peace.

Contributing in no small degree is PURITE—the scientific flux, which aids materially in speeding production, lowering costs and maintaining the maximum output of sound, tough gray iron and converter steel castings.

In the cupola Purite improves melting conditions and reduces sulphur pick-up . . . in the ladle it removes sulphur as required to meet specifications. In both applications Purite refines the iron . . . that means stronger, cleaner castings and fewer rejects. Write for Bulletin P-41 which describes the uses of Purite.

# Purite

ARMY E NAVY

**THE MATHIESON ALKALI WORKS (INC.)**
**60 EAST 42ND STREET, NEW YORK, N. Y.**
*(Licensee of Metallurgical Development Company, Inc.)*

**SODA ASH IN ITS MOST EFFICIENT FORM FOR METALLURGICAL PURPOSES**

# Bomber bodyguard

This little chunk of precision-ground heat-treated steel is the core of a caliber .50 machine gun bullet. It's the bodyguard which protects our American bombers when Messerschmitts and Focke-Wulfs come screaming in to attack; and battle records show how devastatingly successful our caliber .50 bullets are.

In this war, a million rounds of ammunition may be fired while you're reading this sentence.

The cores—the actual projectiles which fly through the air from the muzzles of heavy-caliber machine guns—are made from steel "rods." When the war emergency came, Bethlehem continuous mills were turning out steel for America at peace—steel for coiled springs for automobile seat cushions and mattresses, for pump chain, for clothes line and baby-carriage-wheel spokes; for woven wire farm fence and nails.

Now Bethlehem mills are working for the armed forces. From their swiftly-turning rolls come bullet-core steel by the thousands of tons for our fighting men—and mile upon mile of rushing rods of steel to be drawn into wire for ships' rigging and harbor-defense strand, for coast-defense communication systems and camouflage netting, and for scores of other war-time uses in the battle areas and on the home front.

★ ★ BETHLEHEM STEEL ★ ★

Hot steel for bullet cores speeding around a "looping stand" in Bethlehem's continuous mill. Traveling at a top-speed of 1200 feet per minute, this steel rod rushes through the mill, is coiled onto take-up reels. Then, following quick but critical inspection, the rod is further processed and hurried on its way to the bullet-core makers.

*Photo—Harold M. Lam*

# . . . to make a good Bentonite!

Just as armies need speed and strength for victory, so foundries need them for production. Hundreds of foundries get them both—in every bag, in every ton, in every carload of Federal Green Bond they use.

Green Bond is the ideal foundry bentonite. Uniform grinding means high-speed blending with sand—you can't beat it for today's new faster mullers. High strength spells economy—a little goes a long way.

When you think of bentonite, remember this: You can't buy a better bentonite than Federal Green Bond!

## THE FEDERAL FOUNDRY SUPPLY COMPANY

4600 East 71st Street • Cleveland 5, Ohio

Seacoal Plant
CROWN HILL, W. VA. • CHICAGO • CHATTANOOGA, TENN. • DETROIT • MILWAUKEE • MINNEAPOLIS • NEW YORK • ST. LOUIS • RICHMOND, VA. • Mines UPTON, W

# THE FOUNDRY

for SEPTEMBER 1943

VOLUME 71 NUMBER 9


## Editorial Staff

FRANK G. STEINEBACH
*Editor*

PAT DWYER
*Engineering Editor*

EDWIN BREMER
*Metallurgical Editor*

WILLIAM G. GUDE
*Associate Editor*

DON S. CADOT
*Art Editor*

*New York* . . . . . B. K. PRICE
L. E. BROWNE
*Chicago* . . . . . E. F. ROSS
*Detroit* . . . . . A. H. ALLEN
*Pittsburgh* . . . . . R. L. HARTFORD
*Washington* . . . . . L. M. LAMM
*London* . . . . . VINCENT DELPORT

## Advisory Staff

JOHN W. BOLTON
ALBERT E. GROVER
JOHN HOWE HALL
N. K. B. PATCH
HARRY A. SCHWARTZ

## Business Staff

J. M. LATHROP
*Advertising Manager*

*New York* . . . . . J. F. AHRENS
*Chicago* . . . . . L. C. PELOTT
G. A. POPE
*Cleveland* . . . . A. L. KLINGEMAN
R. C. WELLMAN
*Los Angeles* . . . . . F. J. FULLER

## Main Office

Penton Building, Cleveland, 13, Ohio

## Branch Offices

*New York*, 17 . . . 110 East 42nd Street
*Chicago*, 11 . . . 520 N. Michigan Avenue
*Detroit*, 2 . . . . 6560 Cass Avenue
*Los Angeles*, 4 . 130 N. Hampshire Avenue
*Pittsburgh*, 19 . . . . Koppers Building
*Washington*, 4 . . National Press Building
*London* . . . . . 2, Caxton Street
Westminster, S.W. 1.



THE FOUNDRY is published monthly by THE PENTON PUBLISHING CO., Penton Building, 1213 West Third Street, Cleveland, O. EARL L. SHANER, President and Treasurer; GEORGE O. HAYS, Vice President and FRANK G. STEINEBACH, Secretary

*Subscription:* In the United States and possessions, one year, $2.00, three years, $5.00. Single copies 25 cents. Copies published three months or more previous to date of current issue, 50 cents

*Member:* Audit Bureau of Circulations, Associated Business Papers, National Publisher's Association.

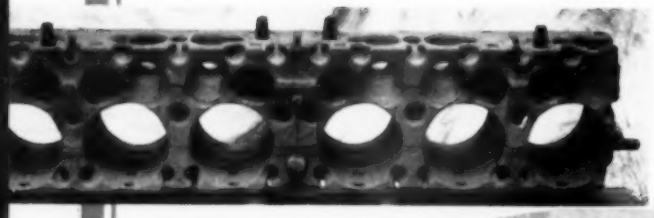
Copyright 1943 by THE PENTON PUBLISHING CO.

Entered as second class matter at postoffice at Cleveland under the act of March 3, 1879.


| | Page |
|---|---|
| Editorial | 89 |
| Molding Large Bronze Propellers<br>By PAT DWYER | 90 |
| Pours Triplex Steel on Conveyors<br>By A. H. ALLEN | 94 |
| Aluminum Castings Poured in Cores<br>By WILLIAM G. GUDE | 96 |
| Institute of British Foundrymen Hold Annual Meeting<br>By VINCENT DELPORT | 100 |
| Foundry Metallurgy in the Castings Industry<br>By JOHN W. BOLTON | 101 |
| Malleable Iron Castings in Ordnance<br>By LT. COL. J. H. FRYE | 102 |
| Crucibles Need Care<br>By FRED L. WOLF | 105 |
| Controls Manganese Bronze Melting<br>By N. K. B. PATCH | 106 |
| British Use Gray Cast Iron for Trench Mortar Bombs | 107 |
| Using Aluminum Casting Alloys Efficiently | 109 |
| Among Detroit Foundries<br>By A. H. ALLEN | 124 |
| The Adventures of Bill<br>By PAT DWYER | 132 |
| Air Brake Company Modernizes Cleaning Department | 146 |
| Basic Cupola Lining Aids Desulphurization | 171 |
| Cast NE Steel Gears Substituted for Forgings<br>By AL ZWALD | 175 |

| | | | |
|---|---|---|---|
| Questions and Answers | 110 | Readers' Comment | 165 |
| Men of Industry | 116 | Group Activities | 166 |
| Equipment and Supplies | 138 | Washington Notes | 168 |
| Foundry Developments | 148 | Foundry Activities | 170 |
| Foundry Comment | 156 | Where-to-Buy Directory | 204 |
| Obituary | 164 | Index to Advertisers | 238 |

# White Engines



HITLER never heard of Linoil and that is not surprising. Not one person in ten thousand of our own 130 million has heard of it either—or even knows what a foundry core is.

But the 10 or 15 thousand people who do know Linoil are just about the most important men in the war—the foundrymen. We might fight a war without generals but how could we do it without the metal pourers?

The foundrymen know Linoil as their staunch aid in mass production, an economy in peace, an indispensably dependable ally in war.

The foundryman knows, whether he is using a drum a month or a tank car a week, that he is using a perfectly balanced, scientifically developed, accurately made core oil; that he is getting full value for his money in every drop of Linoil; that the uniformity of Linoil is the best kind of insurance against loss of time, loss of money, loss of scheduled delivery.

When the evil forces of Fascism, Nazism and Japanese Imperialism are finally crushed to earth no one will claim Linoil did it, but every foundryman will know that Linoil cored castings played a big part in the K. O.

**THE WERNER G.**

(DIVISION OF ARCHER-

2191 WEST 110 STREET WOODBINE

# Join Battle with Axis Tanks

Pictured in this advertisement are war cores from The Allyne-Ryan Foundry Company, Cleveland, Ohio. On this page are cylinder cores for a diesel engine. The core diameter is 10 inches. Removable sleeve linings are used and the blocks have 8, 16 or 32 cylinders. These engines are used in naval craft and heavy military vehicles.

On the other page the gun mounted scrappers at the top are the powerful Half-Trac Tank Destroyers, built by the White Motor Company of Cleveland and driven by the powerful White Super Power Engines.

Immediately below the Tank Destroyers is the cylinder block core for the 6

cylinder Super Power Engine. Below this are the cores for another White Engine being installed in huge quantities in military vehicles.

The Allyne-Ryan Foundry Company use Linoil and they have used it without interruption for 30 years.

LINOIL

"You may write your own testimonial about Linoil and I will sign it," says Mike Sweeney, Vice-President and Treasurer of The Allyne-Ryan Foundry Company. "We bought one of the first drums of Linoil that Werner Smith ever made and we have never stopped using Linoil. We have tried out plenty of other binders, and I can say truthfully we have never tried anything that in our opinion equalled Linoil for our purposes."

SMITH COMPANY

DANIELS - MIDLAND COMPANY)

4690 CLEVELAND, OHIO 2

# TREAT 'EM RIGHT!

# BLAST C
## saves P
## CUTTING T

CURRENT SHORTAGES in cutting tools are so "fraught with danger to the war program" that the War Production Board has issued an appeal for drastic conservation to the entire metal industry.

The machining of imperfectly cleaned castings, forgings and heat treated parts—those having minute grains of sand burned into their surfaces, or hardened scale still clinging to their heat treated surfaces—makes one cutting tool extravagance that industry can easily, *and quickly*, eliminate.

A blast cleaned part—produced by Pangborn Air Blast or Rotoblast equipment—

***SAVE YOUR CUTTING TOOLS—***

is c
or
hen
iten
and
noti
had
savi
insta
Airle
Spec
work
for
requ

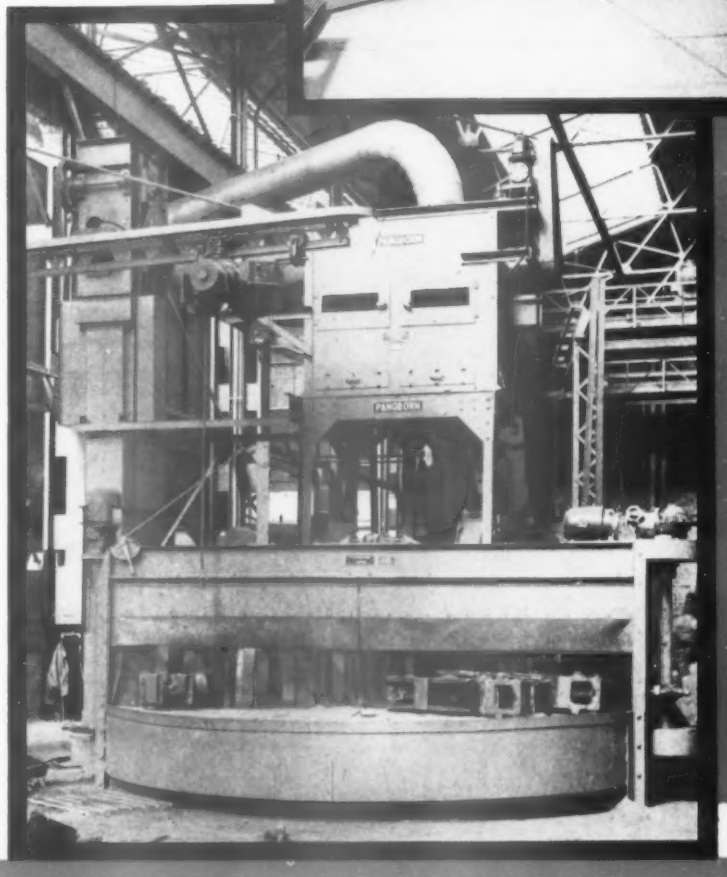
**BLA**

**WORLD'S LARGEST MANUFACTURER OF BLAST**

# PANG

**PANGBORN CORPORATION . . . . . .**

# CLEANING priceless TOOLS!



is cleaned down to virgin metal. No sand or scale is left to destroy cutting tools—hence extra long life for those priceless items. Blast cleaning also discloses flaws and fissures that otherwise would not be noticed until after machining operations had gotten well along the way. These two savings alone often repay the cost of blast installations in a short time.

Airless ROTOBLAST Barrels, Tables and Special Machines are available for most work—and Air Blast Rooms and Cabinets for unusual or heavy work. Catalogs on request.

***BLAST CLEAN WITH "PANGBORNS"***

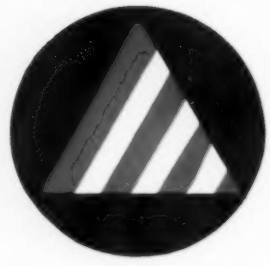
**CLEANING AND DUST CONTROL EQUIPMENT**

# BORN

HAGERSTOWN, MARYLAND

PANGBORN CORPORATION

# Champions weath



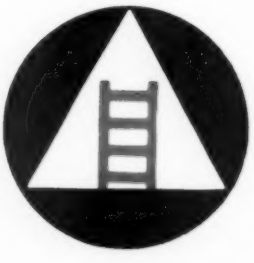
AIR RAID WARDENS

DEMOLITION AND CLEARANCE CREWS

AUXILIARY FIREMEN

DECONTAMINATION SQUADS

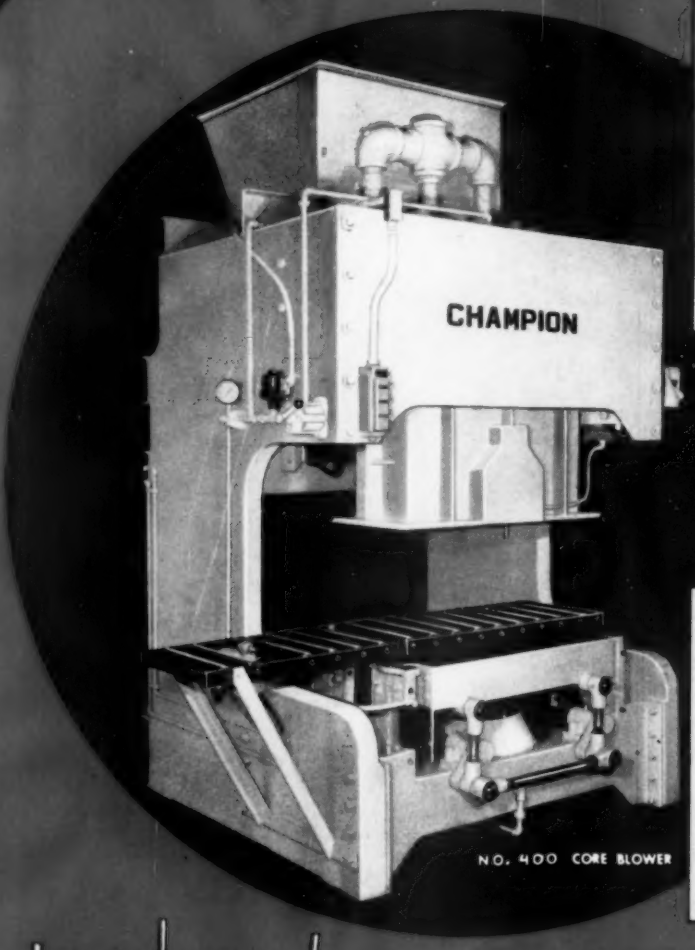
MESSENGERS



RESCUE SQUADS

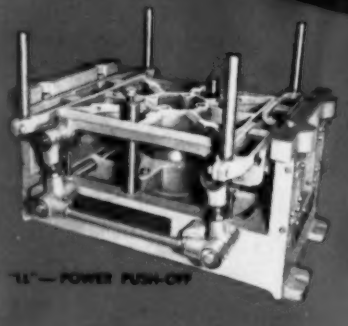
EMERGENCY FOO AND HOUSING CO

AD REPA




**Champion**
**MOLDING and CORE MACHINES**

**45 years**
**OF SERVICE TO THE FOUNDRY INDUSTRY**


"LL"—POWER PUSH-OFF

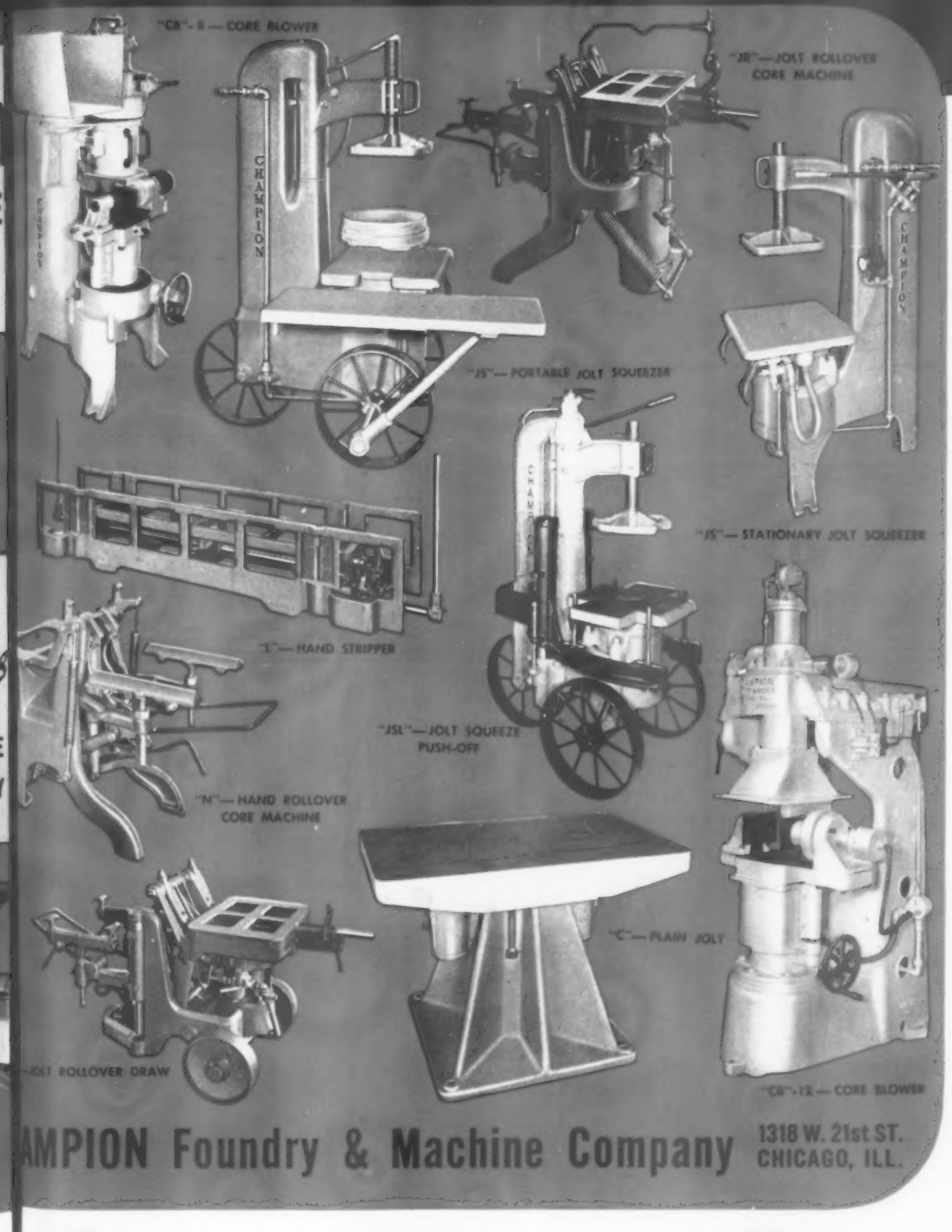
"W"—HAND ROLLOVER

"O"—JOLT ROLLOVER CORE MACHINE

**Every Champion installation is guaranteed to do the job you expect, exactly as you plan it.**

AMP

# ...the Chevrons of Experience



FIRE WATCHERS

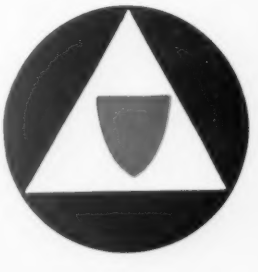
THE MEDICAL CORPS

NURSES' AIDES CORPS

AD REPAIR CREWS

DRIVERS' CORPS

BOMB SQUADS



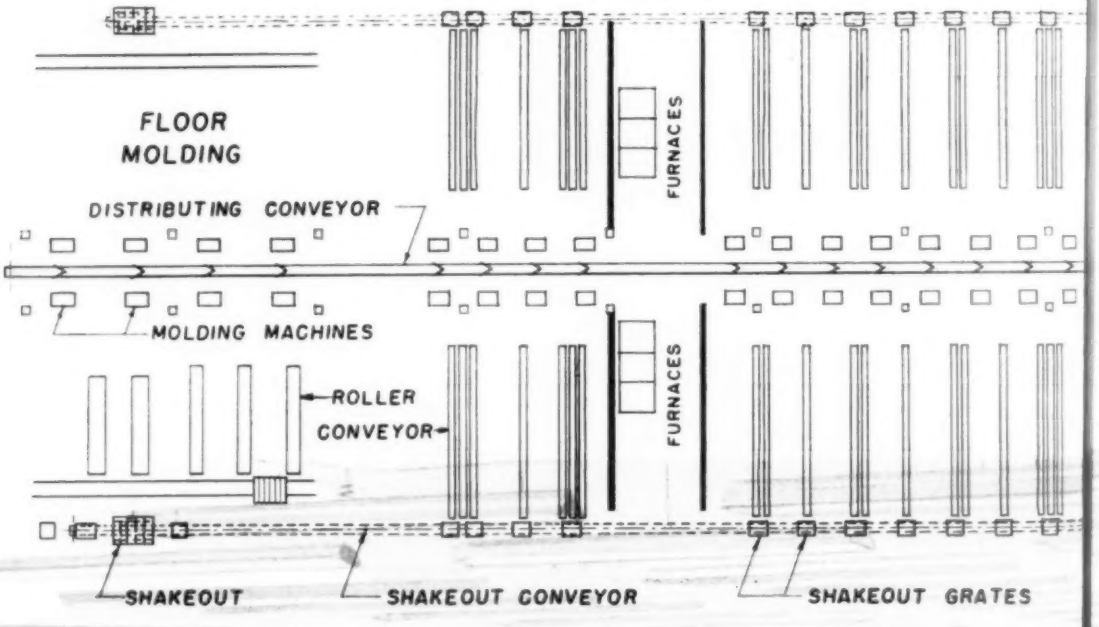
AUXILIARY POLICE

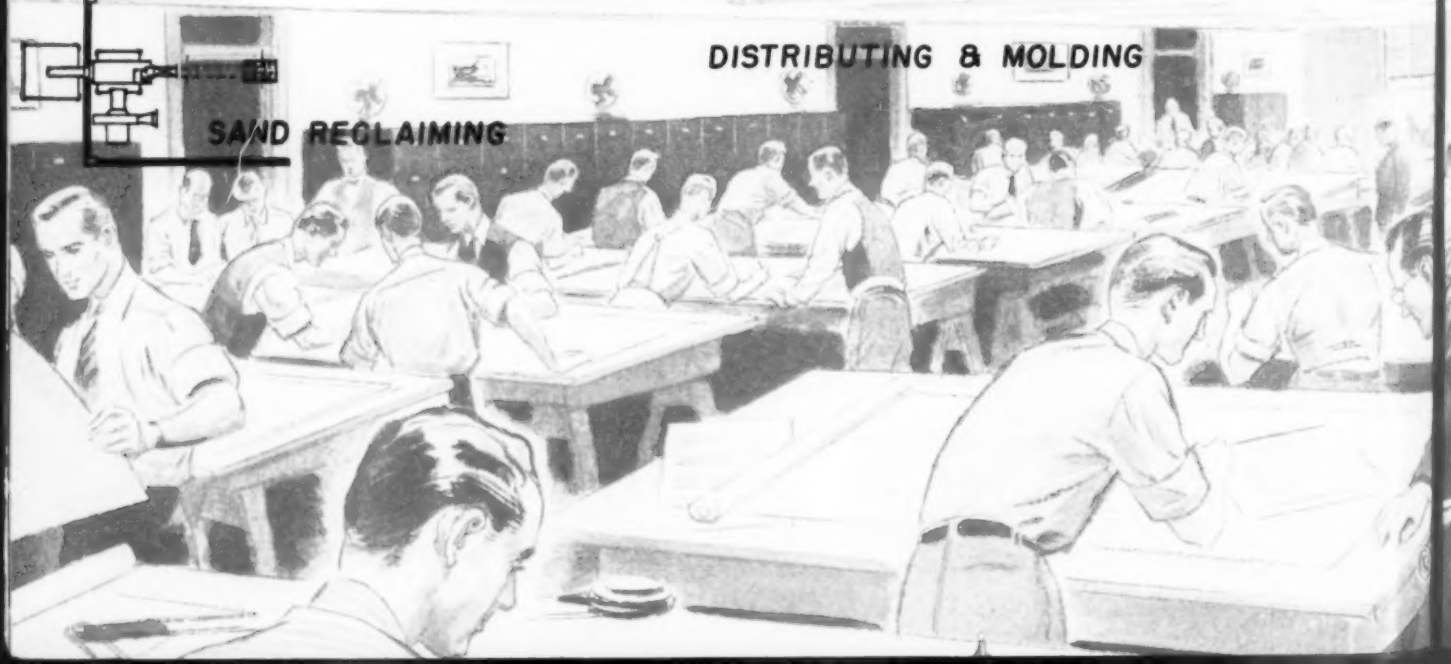
DECONTAMINATION SQUADS MESSENGERS RESCUE SQUADS AND HOUSING CO

# ENGINEERED

## Complete Sand Systems for ALUMINUM FOUNDRIES

*During the past two ye more than 1000 Simpson tensive Mixers have b installed in foundries of types to provide proper mulled sand for the prod tion of castings for war.*



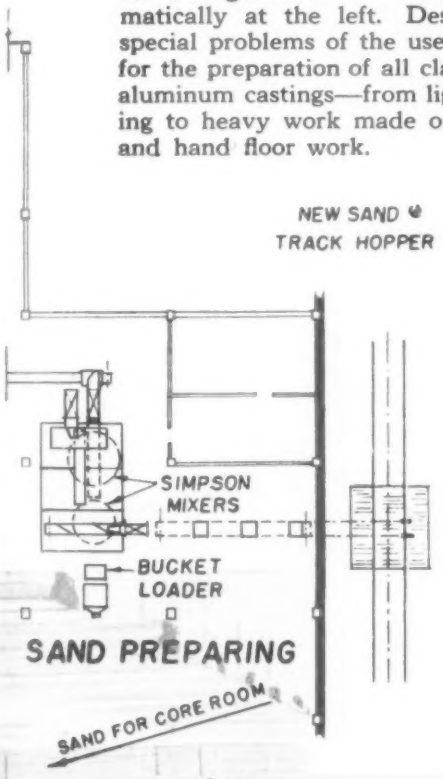



# BY *National* MEANS

## HIGH QUALITY CASTINGS . . PEAK PRODUCTION . . BETTER FINISHES . . SAND CONTROL . . LOWER COSTS

NATIONAL Engineering Company has built many systems for the proper handling, preparation, storage, reclamation and control of aluminum foundry sands. Systems designed and installed by National have resulted in substantial savings in sand, bonds, and man-hours, with greatly reduced casting losses, cleaning and finishing costs.

One of the systems engineered by National for a large aluminum foundry is shown schematically at the left. Designed to meet the special problems of the user, this unit provides for the preparation of all classes of high quality aluminum castings—from light snap-flask molding to heavy work made on rollover machines and hand floor work.




Sand is closely controlled to required specifications of permeability, strength and moisture by preparation in No. 3 and No. 2 Simpson Intensive Mixers. One operator prepares all molding and core sand for this foundry. After sand is mulled in Simpson Mixers, it is elevated and aerated, then distributed to a belt conveyor. From the conveyor it is plowed off into the molders' hoppers. The molders place the finished molds on roller conveyors which transport them from the molding station through the pouring and cooling zones to the shake-out.

Complete equipment for reclamation is provided: shake-out equipment; screening and magnetic separation of metallic refuse; control of inert fines which permits the maintenance of required permeability, with the absolute minimum of new sand. A core sand reclaiming unit also is provided.

Adequate sand storage over the mixers provides for the delivery of two or three kinds of sand to a batch weigh larry. Equipped with a scale, this insures the proper proportions of each type of sand for each batch. From the weigh larry sand is charged into Simpson Mixers where binders and water are added and the sand properly conditioned.

National Engineering Company has played a vital role in the program to provide adequate facilities for foundry production of war materials. National, in the last two years, has furnished complete sand preparing, sand reclaiming, sand and mold handling units for more than 50 major foundries—for production of aluminum, magnesium, steel, heavy grey iron, malleable and non-ferrous castings.

**Do you have problems of sand or mold handling, sand preparation, reclamation, or control? Whether it's a problem of today, or part of your long range planning, a National Engineer will gladly help you find the answer. Call him in.**

**National Engineering Service** **National Field Service**

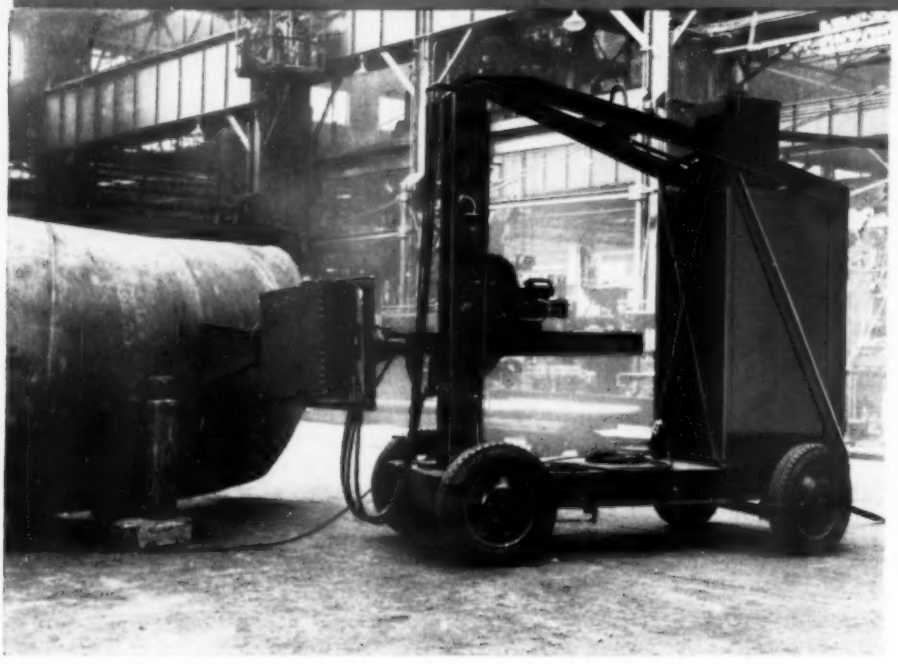
For more than 30 years National Engineering and Field Service, has helped hundreds of foundries solve problems in sand preparation, reclamation, handling, storage and control. Today, National Engineers are constantly on the job helping foundries with problems of sand handling and control on construction, maintenance, repair or new requirements. National Engineering and Field Service is available and eager to help you whenever and wherever you need it.

## NATIONAL ENGINEERING COMPANY

MACHINERY HALL BUILDING • CHICAGO 6, ILLINOIS

Manufacturers and Selling Agents for Continental European Countries: —The George Fischer Steel & Iron Works, Schaffhausen, Switzerland. For the British Possessions, Excluding Canada and Australia — August's Limited, Halifax, England. For Canada — Dominion Engineering Co., Ltd., Montreal, Canada. For Australia and New Zealand — Gibson, Battle & Co., Pty., Ltd. Sydney, Australia

# THERE'S A G-E X-RAY UNIT FOR E



In 1939, G-E X-Ray introduced this mobile jib crane truck mounting which provides an unusual degree of flexibility and permits easy, accurate positioning for practically all types of radiographic inspection. The tube head column can be rotated 360° about its vertical axis and has a radiographic area of 270° around the chassis. The travel range of the tube head is 6 feet vertical and 4 feet horizontal. This unit can be moved about the plant very easily by available man-power; for long hauls a tractor can be coupled to the unit and it can be moved to the job. This unit is available for use either with the G-E Model OX-200 (200,000-volt) or the G-E Model OX-250 (250,000-volt) Industrial X-Ray Units. Within their range, these x-ray units offer fast radiographic inspection of castings and weldments which cannot be conveniently moved to the x-ray inspection department.

In 1938, G-E X-Ray introduced the OX-140 (140,000-volt) unit — designed and built expressly to meet the low-voltage radiographic inspection needs of the light alloy casting industry. Shown here is the G-E Model S-57 wall-mounted tube stand which provides complete flexibility and wide useful radiographic area; transformer can be arranged for floor or ceiling mounting. The OX-140 mobile truck unit provides the same degree of flexibility and angulation available with the wall-mounted stand.

In 1941, G-E X-Ray introduced the 1,000,000-volt Industrial X-Ray Unit, shown here mounted on an overhead bridge crane which provides the complete flexibility necessary to facilitate fast radiographic inspection of large, heavy specimens. 5¼-inch welded plate can be radiographed in 10 minutes with the G-E million-volt unit as compared with the 7½-hour exposure formerly required to do the same job. The G-E 1,000 Kvp. unit does the job faster, and the end results are materially better and provide more diagnostic information.

# EVERY INSPECTION PROBLEM

In 1942, G-E X-Ray introduced the Semi-Automatic Unit which provides rapid, accurate production-line x-ray examination of light alloy castings or metal assemblies.

For more than 25 years G-E Engineers have designed and manufactured x-ray diffraction equipment. The G-E XRD-1 Unit is the logical culmination of these years of experience and it has been accepted by chemists, engineers, and metallurgists as unparalleled for precision research.

HUNDREDS of high-powered G-E Industrial X-Ray Units are in daily use inspecting vital materials manufactured for the United Nations. With today's increased production schedules it is necessary to insure quality, save time and cut rejects to a minimum so that the flow of essential war materials will not be interrupted.

G-E Industrial X-Ray Units are designed from the drawing board on up for *industrial* use. They incorporate x-ray transformers and tubes, controls, and mountings especially designed for industrial service. Strength and durability are built into each unit to insure a maximum of uninterrupted service.

G-E X-Ray offers you the services of its corps of industrial x-ray engineers who have a background of more than 20 years' experience in applying x-ray examination in foundries, welding shops, aircraft factories, and other manufacturing establishments. They are aware of the production and inspection problems which are encountered in modern industrial practices. You can depend upon their recommendation as to which G-E Industrial X-Ray Unit will provide complete x-ray inspection in an *economical time.* And if x-ray inspection cannot be applied effectively and economically—they will be the first to tell you.

We are interested in a G E Industrial X-Ray Unit to examine

- ☐ Aluminum-base castings.....inches thick.
- ☐ Zinc base castings.....inches thick.
- ☐ Copper base castings.....inches thick.
- ☐ Iron base castings.....inches thick.
- ☐ Weldments ☐ X-Ray Diffraction

Please have your engineer phone me for an appointment at my convenience.

Name_____

Title_____

Company_____

City_____ State_____

(Attach to your company letterhead)

S34

ARMY E NAVY

*Today's Best Buy — U. S. War Bonds*

**GENERAL ELECTRIC X-RAY CORPORATION**

2012 JACKSON BLVD. CHICAGO (12), ILL., U. S. A.

# THE Speedslinger

Operation of the Speedslinger requires less human energy than driving an automobile. Women operators are employed in many foundries.

Speedslingers, such as the one above, assure quicker conversion to peace-time market requirements.

This Speedslinger is ramming tank hulls at startling savings in time and cost.

# Many Times Better!

## INCREASES PRODUCTION—CUTS COST—IMPROVES QUALITY

**All kinds of ramming jobs—from the smallest to the largest—from the simplest to the most complex—for iron or steel castings—all are within the range of work performed at low cost by the Speedslinger.**

Never in the history of founding has there been so versatile a machine as the Speedslinger. Taking in its stride all kinds and sizes of jobs, it greatly increases foundry profits through savings of manpower, floor space, time, and metal. In foundries large and small, the Speedslinger pays for itself in an amazingly short time.

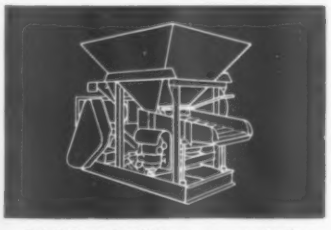
When the Japs struck at Pearl Harbor many foundries throughout the country were already making use of the great advantages of the Speedslinger—lower cost castings, better castings, increased number of castings—and, of tremendous importance to the war effort, quick conversion to products for war with no time lost for re-arranging molding floors and the search for more molders and helpers—the Speedslingers were there with capacity to press other foundry facilities to the absolute limit. Those foundries started at once to make more castings and better castings for guns, tanks, ships at prices that saved millions of tax dollars.

Throughout the months since Pearl Harbor, foundry after foundry has installed one or more Speedslingers—increasing war production—doing a better job for Victory.

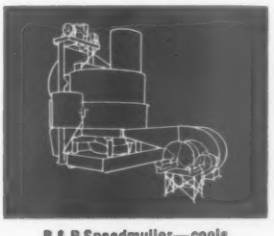
*Speedslinger is Designed for War or Peace*

All foundries are on the alert, not only to do a better war job, but to be in position to make the quickest possible conversion to civilian production when Victory has been won. Speedslingers—requiring no change for conversion to peace-time production—will help them to be among the first to get products in mass quantity into a vast and waiting peace-time market.

Whether you pour gray iron, malleable iron, or steel—whether your castings are mixed, small, medium, or large—it will be to your advantage to investigate the versatile Speedslinger. Get in touch at once with Beardsley and Piper engineers. They will show you Better Methods for greater profits in today's and tomorrow's markets.

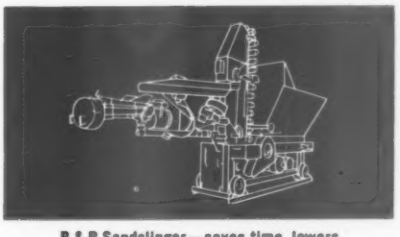


B & P Sand Conditioner—economically conditions facing and backing sand.



B & P Speedmuller—cools, aerates, and mulls faster.

B & P Screenerator—double aerates, blends, piles.



B & P Sandslinger—saves time, lowers ramming cost on molds and cores.

B & P Shake-Out—for molds of every shape and size.

THE BEARDSLEY & PIPER COMPANY

B&P

"BETTER METHODS"

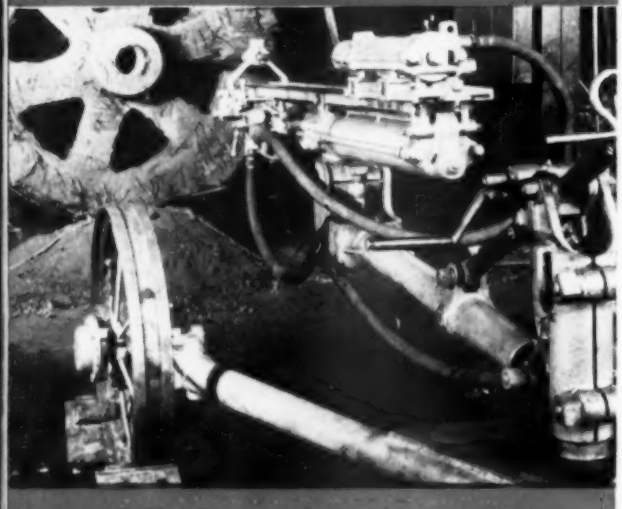
WRITE FOR BULLETIN!

**THE BEARDSLEY & PIPER COMPANY**

2541 North Keeler Avenue — Chicago 39, Illinois

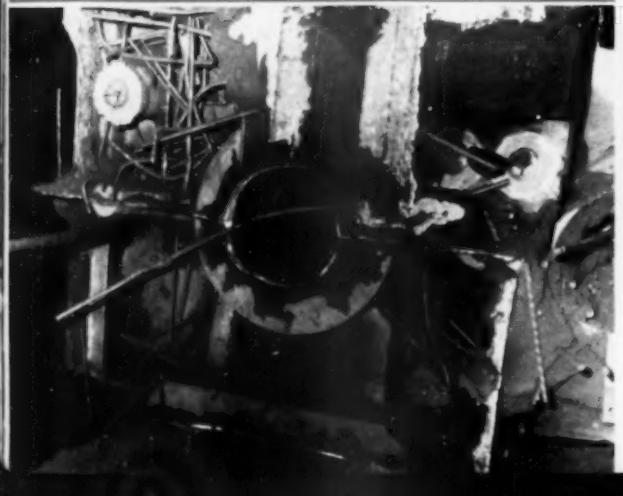
# SENSATIONAL SPEED
## in core breaking

*Removing cores from a marine cylinder casting*



*Knocking out the inside cores*

*A close-up view showing removal of some of the heavily-rodded outside cores*

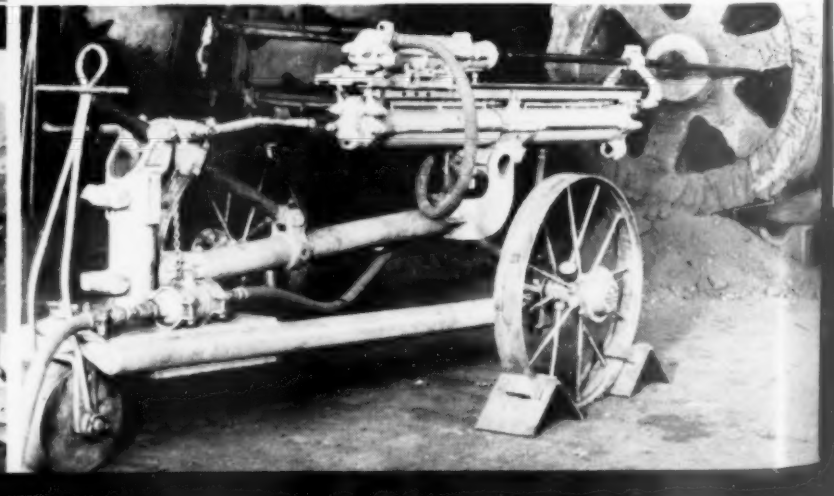


**ACTUAL RECORDS**
of time saved with the
**MOGUL**

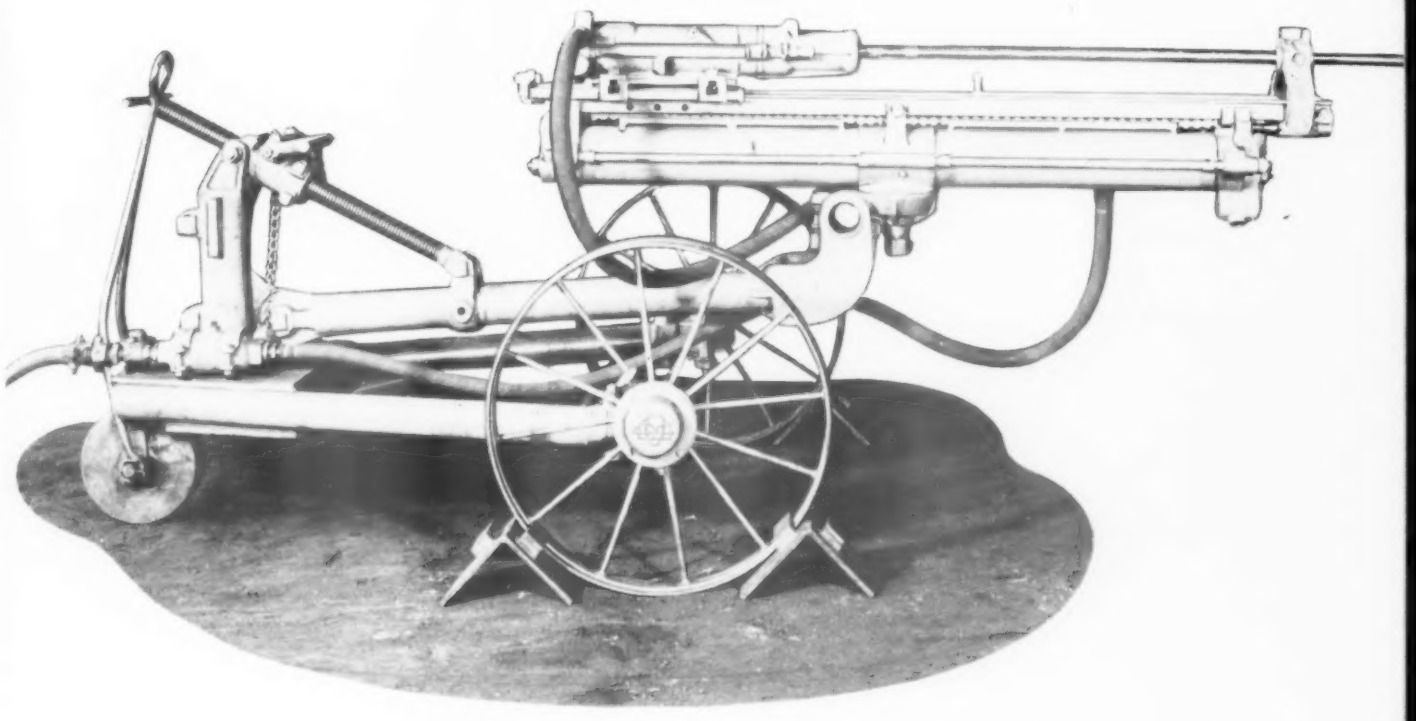
At The Fulton Foundry & Machine Co. the Mogul performed as follows—

- **FROM DAYS TO HOURS.** Marine cylinders weighing close to 12,000 pounds each, formerly required about 2 days' labor to remove cores. With the Mogul breaker, the core knock-out time was reduced to 12 to 14 hours.
- **FROM HOURS TO MINUTES.** Cylinder liner castings with cores requiring an average of three hours knock-out time had cores removed by the Mogul in 15 minutes.
- **2 MEN DO THE WORK OF 4, FASTER.** Long drum castings weighing 12 to 14 tons, requiring the work of four men 3 days to clean, were cleaned with the Mogul in less than a day, with the regular crew of two men doing the work.

*The Mogul set up for removing cores from a 14-ton casting*



# with the CLEVELAND MOGUL



FOUNDRIES producing castings weighing 500 pounds and more will save time and money on core knock-out work by using this Cleveland Mogul Core Breaker. The Mogul is a combination of *tried* and *tested* mechanisms, covered by patents owned by The Cleveland Rock Drill Co.

The Cleveland Mogul comprises a powerful pneumatic hammer mounted on wheels to make it readily mobile. The mounting design permits quick raising or lowering of the hammer-vibrator, or swinging it from side to side. Standard 1¼" round drill steels, with detachable bits are used. The machine is rolled up to the casting to be cleaned, the hammer quickly raised to position, and the drill bit is fed into the core. The operator utilizes the quick-acting pneumatic feed to ram and withdraw the steel bit into and out of the core. The combination of ramming action, hammering, rotation of the bit, and resulting vibration, causes quick disintegration of even the hardest, most heavily-rodded cores.

In addition to greatly speeding core breaking, the Cleveland Mogul has another advantage—it is possible to clean the cores from much hotter castings than by ordinary methods. For large, heavy castings, the time gained in starting to remove cores is often a full day.

*We make shipment of these machines within two to three weeks from receipt of order. Write for Bulletin 134.*

## SPECIFICATIONS

**Cleveland Model CBM-39 Mogul Core Breaker**

| | |
|---|---|
| Length | 9' 3" |
| Weight | 1200 lbs. |
| Weight crated for shipment | 1450 lbs. |
| Wheel Gauge | 4' 8½" |
| Maximum boom height (to center line of drill bit) | 6' |
| Air required to operate continuously | 200 cu. ft. |

Operating crew—two. One man controls feed hammer and swings boom from side to side. The other operator turns the crank for raising and lowering the boom.


**THE CLEVELAND ROCK DRILL COMPANY**

*Division of The Cleveland Pneumatic Tool Company*

3781 EAST 77th STREET • CLEVELAND 5, OHIO

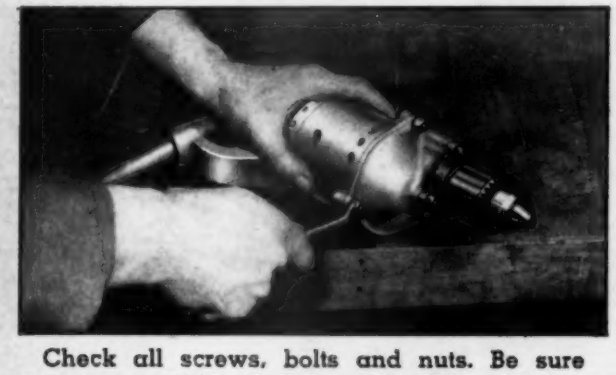
BRANCH OFFICES IN ALL PRINCIPAL CITIES

# Three More Simple Check-Ups

## THAT HELP TO KEEP CP UNIVERSALS IN CONTINUOUS SERVICE

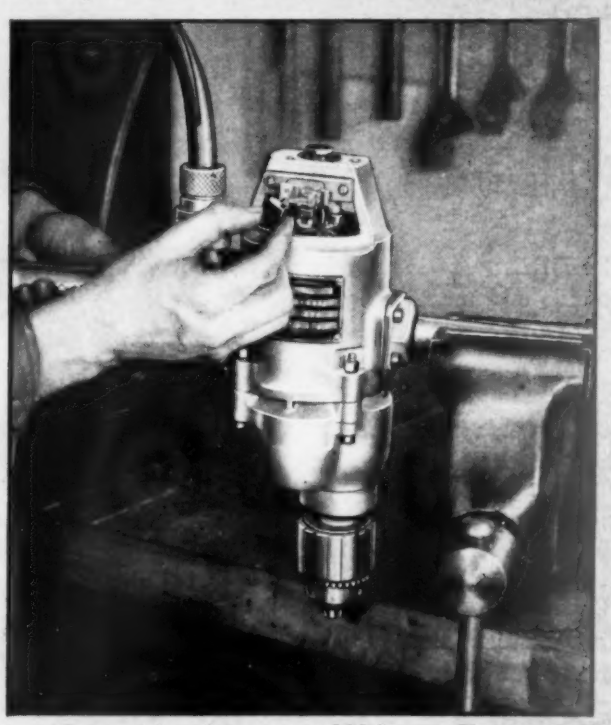
Keeping a drill, grinder, nut runner, screw driver or other CP Universal Electric Tool in continuous service is largely a matter of simple, preventive maintenance – because CP Universals are distinctly production tools, designed and built for steady, hard service. The three simple precautions illustrated on this page (and the periodic lubrication featured in a previous advertisement) will help you get maximum service from all models of CP Universal Electric Tools.

### HOW TO GET MAXIMUM SERVICE FROM CP UNIVERSAL ELECTRIC TOOLS



Check all screws, bolts and nuts. Be sure they are tight before putting tool into service.

Keep ventilation openings free of dirt. They should be blown out regularly, with air hose.

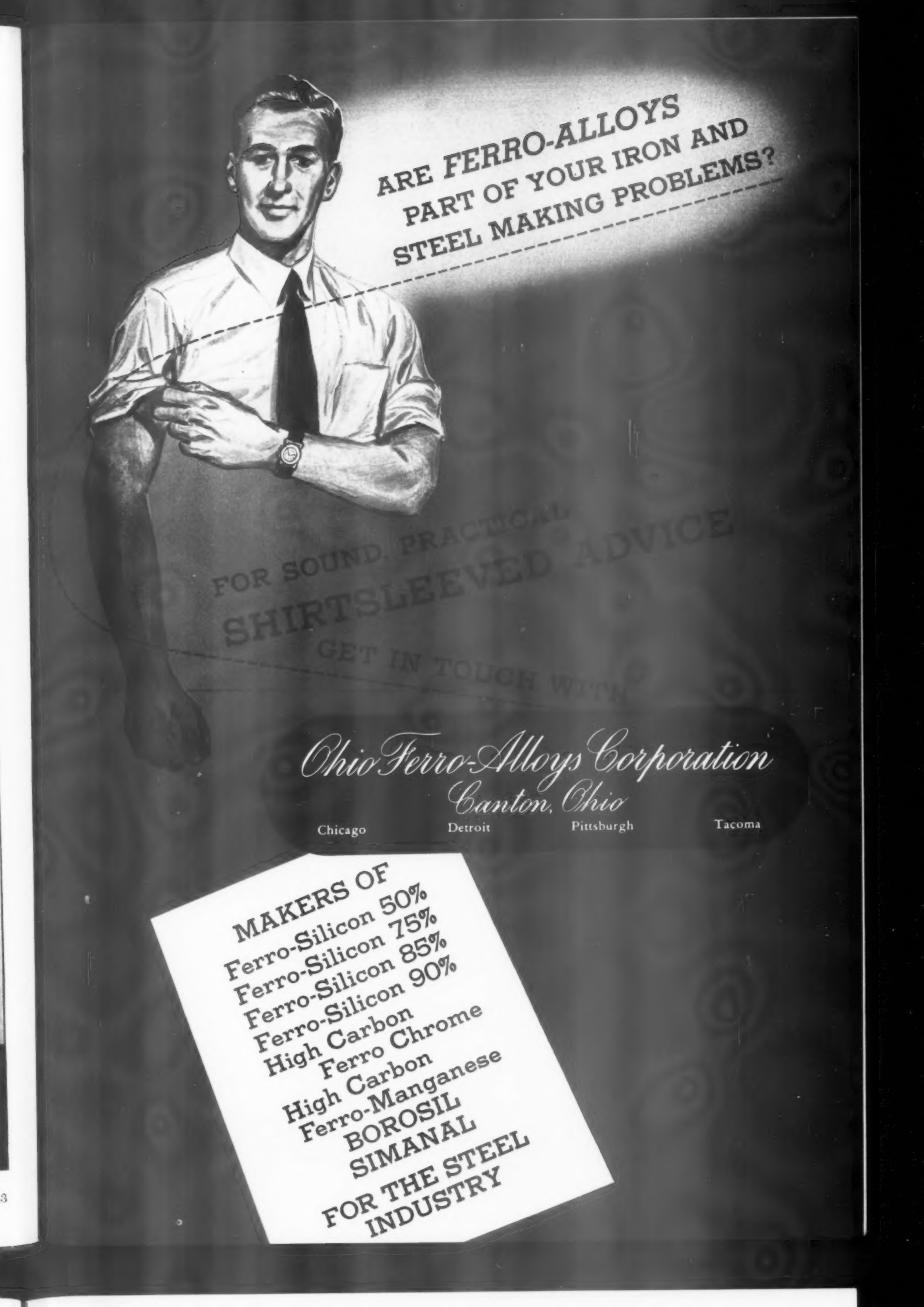


Inspect brushes every 200 hours. If worn replace with CP brush, the right grade for long life of brush and commutator.

★★★★★★★★
PNEUMATIC TOOLS
ELECTRIC TOOLS
(Hicycle...Universal)
ROCK DRILLS

CHICAGO PNEUMATIC
TOOL CP COMPANY
General Offices: 8 East 44th Street, New York 17, N. Y.

★★★★★★★★
AIR COMPRESSORS
VACUUM PUMPS
DIESEL ENGINES
AVIATION ACCESSORIES


ARE FERRO-ALLOYS
PART OF YOUR IRON AND
STEEL MAKING PROBLEMS?
FOR SOUND, PRACTICAL
SHIRTSLEEVED ADVICE
GET IN TOUCH WITH
Ohio Ferro-Alloys Corporation
Canton, Ohio
Chicago
Detroit
Pittsburgh
Tacoma
MAKERS OF
Ferro-Silicon 50%
Ferro-Silicon 75%
Ferro-Silicon 85%
Ferro-Silicon 90%
High Carbon
Ferro Chrome
High Carbon
Ferro-Manganese
BOROSIL
SIMANAL
FOR THE STEEL
INDUSTRY

★ ★ ★ ★ ★ ★ ★

## *WPB Seeks Cooperation Of Foundries In Correcting Unbalanced Situation In Primary And Secondary Aluminum*

### Primary Producers Overburdened With Orders While Secondary Ingot Supplies Are Backing Up

WASHINGTON, July 29.—A noticeable trend in the use of primary aluminum by foundries has created a situation whereby primary producers are overburdened with orders for ingot while secondary ingot is backing up in the hands of approved smelters, W.P.B. revealed today.

The situation has developed since the change in operational procedure under C.M.P., whereby foundries are licensed to purchase ingot without submitting their individual orders to W.P.B. for analysis.

The responsibility for this trend, W.P.B. said, rests either with the foundries who may be ordering a higher grade of metal than is necessary because of easier handling, or the consumers ordering castings and setting a more stringent standard of quality than is needed to meet their contract specifications.

The claimant agencies, W.P.B. said, rarely specify use of primary metal when issuing contracts. Instead, a performance standard for the ultimate end product is usually specified, which, in most instances could be attained by using metal produced by secondary smelters.

Regardless of where the responsibility lies, W.P.B. stated, the situation becomes daily more aggravated, and it therefore becomes necessary to solicit the cooperation of foundries in a most vigorous pursuit of the cause for this gravitation to the use of primary metal.

W.P.B. notified foundries and die casting plants that any orders which they receive for castings definitely specifying the use of primary metal should be challenged. When customers insist on the use of primary metal in castings for which foundries doubt the necessity, the prime contract number, the part number, part name, and end use of the castings should be obtained and forwarded to the castings section of the Aluminum and Magnesium Division.

Foundries were advised that in order to relieve the immediate unbalanced situation in secondary metal those already using a large proportion of secondary alloys are invited to place orders and build up their inventories of this material to a 60 day supply instead of the normal 30 day supply which is considered a practicable working inventory.

*Reprinted from the American Metal Market*


We are prepared to supply your requirements of Laboratory Controlled Aluminum Alloys that have been TESTED and APPROVED in the field.

★

**The NATIONAL SMELTING CO., Cleveland, O.**

# HOW TO KEEP YOUR FOUNDRY IN 1ST Place

## Use DESPATCH Furnaces, Ovens, for these 5 jobs!

"YES SIR, MEN! When foundry output was boosted up umpteen hundred per cent, plenty of short-cuts came to light.

**"Starting in the laboratory,** instead of guess-and-by-gosh methods, Despatch lab ovens are now used. These test sand, oils and binders; first, to see which works best; next, to be sure that incoming raw materials are up to snuff. This saves a lot of money, time and effort and keeps casting output high by ironing out headaches in advance.

**"In the foundry,** Despatch core and mold ovens rapidly bake cores or dry molds just the way they're wanted—really pippins. It makes no difference, either, about the type of Despatch oven (rack, batch, vertical conveyors, etc.), as all handle full loads in record-breaking time.

**"In the heat-treat room,** after castings have been knocked out of Despatch-dried molds, sand-blasted and cleaned up, they're ready to be pepped up in Despatch heat-treating furnaces. Here, in any one of a dozen different types for stress-relieving (for ferrous work) or solution heat-treating or ageing (for non-ferrous), castings get the right treatment every time.

**"To keep you in first place,** Despatch engineers are constantly developing new and different equipment to do the job better. Despatch Convection Heating really does the trick! This war's going to be over soon; and when it is, this new equipment installed now will give you greater advantages in postwar markets.

"Something to think about, men! Take my advice and WRITE TODAY for special literature covering these 5 services to your foundry."

*Torrid*

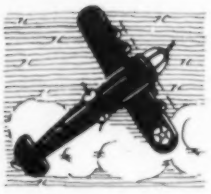
**DESPATCH**
**OVEN COMPANY** MINNEAPOLIS

# Half a Million Tons of castings are made, every month, with Delta core and mold washes . . . . . .

## HOW MUCH IS HALF A MILLION TONS?

Half a million tons equals the displacement of FOURTEEN first line battleships . . . .

or



EIGHTEEN THOUSAND giant Bombers of the type now raining destruction on German cities . . . .

or

EIGHT THOUSAND massive tanks . . . powerful land battlewagons . . . the pride of Allied Armed Forces.

## DELTA CORE & MOLD WASHES

**for STEEL**
**DELTA Core and Mold Wash**

★

**for GREY IRON & MALLEABLE**
**DELTA Grakoat**

★

**for NON-FERROUS METALS**
**DELTA Non-Ferruskoat**

★

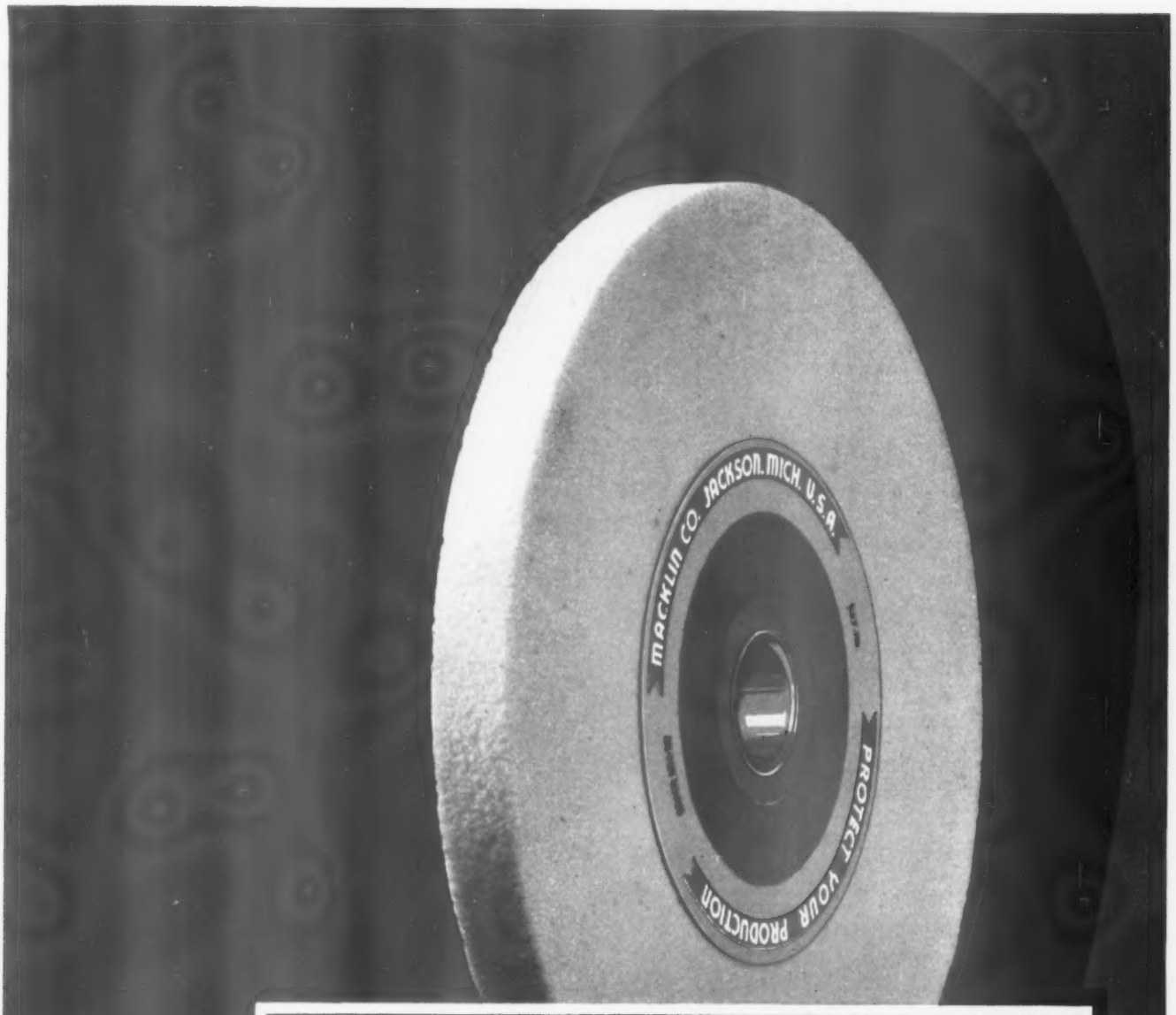
**for HEAVY GREY IRON**
**DELTA Blackoat**

★

Other DELTA Products for the Foundry include; for Core Joints—DELTA Mudding Compound; to Eliminate Skin Drying and Dry Sand Mold Work—DELTA Spray Binders; for Parting, DELTA PARTEX, made from Nut Shells; also DELTA Core Oils, etc.

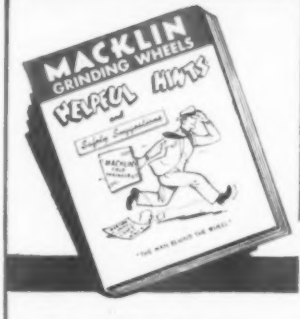
# DELTA OIL PRODUCTS CO.

MANUFACTURERS OF
INDUSTRIAL AND AUTOMOTIVE OILS, GREASES AND COMPOUNDS
MILWAUKEE, WISCONSIN




MACKLIN

GRINDING WHEELS




*This FREE 64-page book still available. Write for your copies.*

MACKLIN Wheels are made in all sizes and shapes in all grain and grade combinations to *"Protect Your Production."*

MACKLIN COMPANY

*Manufacturers of* GRINDING WHEELS — JACKSON, MICHIGAN, U. S. A.

Distributors in all principal cities

*Sales Offices:* — Chicago - New York - Detroit - Pittsburgh - Cleveland - Cincinnati - Milwaukee - Philadelphia

# CLEARFIELD *Improves*

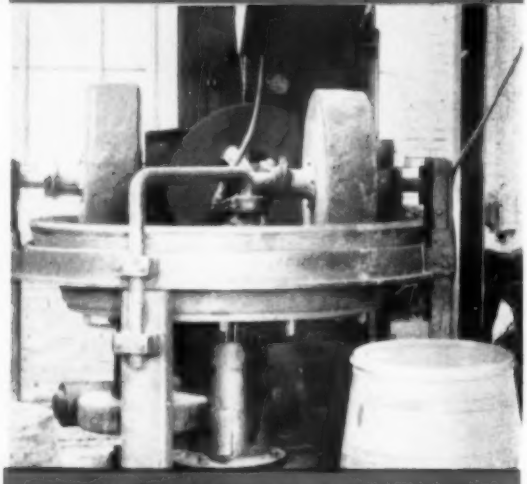
## THE QUALITY AND UNIFORMITY OF YOUR SAND

**SYSTEM SAND** Two 920 Clearfields in a steel foundry installation.

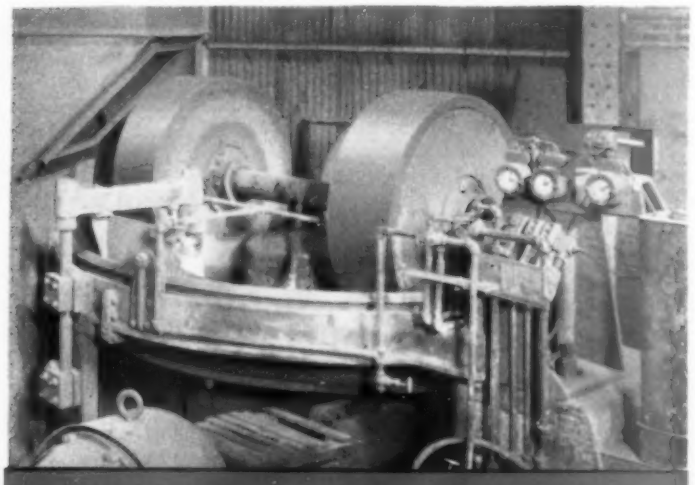
Clearfield Mixers are *complete* units for mixing, tempering and aerating molding sands.

"Clearfields" insure uniform distribution of component sand particles, even density, absence of lumps, and aeration at high speed.

Whatever your sand conditioning requirements, there's a Clearfield for the job.



**FACING SAND** Clearfield "610" Mixer preparing facings for gray iron castings.



**CORE SAND** This Clearfield "920" preparing economical uniform core sand.

### WRITE

for Clearfield Data. For a definite proposal, state quantity and type of sand to be prepared and characteristics of electric current available.

**CLEARFIELD MACHINE COMPANY**

CLEARFIELD
PENNSYLVANIA, U. S. A.

*but*
*a cupola*
*requires*
*conditioning*
*constantly*

Over-eating — poor food — excesses — occasionally upset the human system, requiring a conditioner to restore normal action.

But, in every cupola charge are ingredients which, if not controlled and eliminated, produce inferior castings.

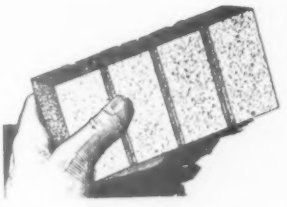
This condition, regularly encountered, is regularly corrected in many leading foundries by the consistent use of Famous Cornell Cupola Flux.

Slag and other impurities are made more fluid by this famous flux and diverted through a more active slag hole instead of being permitted to flow down into the ladle.

The blast is more effective, producing hotter iron and castings that are sounder—more machinable—more capable of withstanding high pressure tests.

The cupola needs less repairing—bottom drops are cleaner—less picking is required—less brick is used and there is less patching up.

*Write for literature and the complete story.*



In convenient, self-measuring form—a brick to a ton—a briquette to 500 pounds of charge.

Fluxes also available for brass, bronze and aluminum.

**THE CLEVELAND FLUX COMPANY**

*Manufacturers of Iron, Brass and Aluminum Flux Since 1917*

CLEVELAND OHIO

# ROTO-CLONE
## DUST CONTROL

**ENGINEERED TO MEET YOUR REQUIREMENTS WILL SOLVE YOUR DUST PROBLEMS AT**

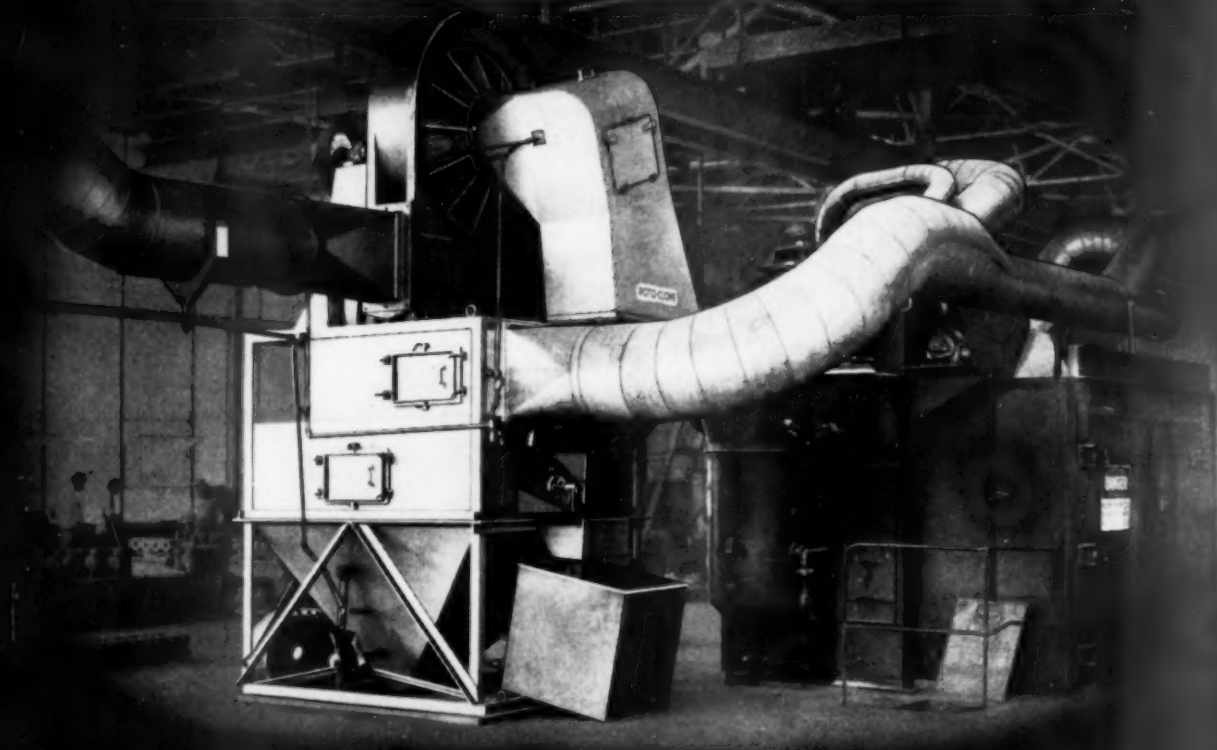
- ✓ SHAKEOUTS
- ✓ SAND SCREENS
- ✓ BELT TRANSFERS
- ✓ MAGNETIC PULLEYS
- ✓ MULLERS
- ELEVATORS ✓
- SANDBLAST ✓
- CASTING CLEANING ✓
- TUMBLING MILLS ✓
- GRINDERS ✓

The Type W Roto-Clone—which combines the scrubbing effect of water sprays with the proven principle of dynamic precipitation—was developed especially for handling fine abrasive foundry dusts containing moisture or steam.

Its compact design and desirable performance characteristics offer distinct advantages where dust in heavy concentration and in a wide range of sizes must be collected.

Send for engineering data and bulletins describing the Roto-Clone —there's no obligation involved.

**AMERICAN AIR FILTER COMPANY, INC.**
INCORPORATED
265 Central Avenue — Louisville, Kentucky
In Canada: Darling Bros., Ltd., Montreal, P. Q.




FOR FOUNDRY AAF DUST CONTROL

# JUST OUT!

## "Aqua-Bond No. 310 Liquid Core Binder

*Says* BERNIE DONNER, widely-known Core Room Foreman Cleveland Co-operative Stove Foundry.

**1 BAKES OUT FASTER**
An emulsified oil sets more quickly with oven heat. Just enough heat to break the emulsion gives the binder an "initial set."

**2 GIVES OFF LESS GAS**
To the extent that water is contained in an emulsion there is less organic material to be burned out on pouring.

**3 BURNS OUT FASTER**
Heat bites more deeply into open type core to burn away the thinly spread bond. Proves a cure for hot cracks in numbers of cases.

**4 MAKES STRONG O**
Faster bonding with oven at contact points of sand than in the form of a fill. cross-sectional strength.

**5 CLEANS OUT QU**
Cores will be thoroughly castings can be more e

**6 QUALIFIES FOR METAL**
Aqua-Bond No. 310 is iron, bronze, aluminu

### Produces An Open Core ... More Even Cross-Sectional St...

AQUA-BOND No. 310 is an emulsified type of oil. As a binder for cores, it shows special values that are not present in a straight core oil.

Why should cores made from an emulsified oil bake out faster in the oven, develop less gas, collapse more freely on pouring, and clean out more quickly from the casting? There is no question about the fact that Aqua-bond No. 310 does just this, but the reasons why are interesting ones and worth looking into.

When oil and water are so completely mixed together that the oil is converted to a colloid condition, they deve... not thin out to the ... heated. Water wil... heat, but if oil is ... heated in the oven, ... migrates toward ... leaving the lower portion more saturated ... oil and denser than the top. The first special value to develop with the use of Aqua-bond No. 310 lies in the fact that it will hold an evenly spread condition in the sand while baking and will produce an open core of more even, cross-sectional strength.

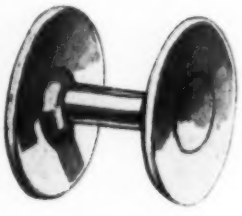
AQUA-BOND No. 310 liquid core binder, an emulsified type of oil, is fully described in the new 4-page booklet just published. Amply illustrated, it gives pertinent information on the manner in which Aqua-Bond bakes out faster, gives off less gas and burns out faster. Aqua-Bond, in use today among leading foundries, makes strong open cores, cleans out quickly and qualifies for all types of metals. For detailed information, let us send you a copy of this new booklet. Just write the address below.

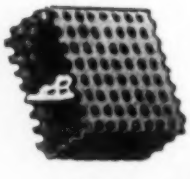
## UNITED OIL MFG. COMPANY

14429 WALNUT STREET

ERIE, PENNSYLVANIA

# KEEP 'EM FIRING!





THE hardest job is still ahead—it may be a long one or a short one—but it's the final push to Victory. From now till then, every production minute should be turned into the utmost efficiency.

If you're not using Fanner Chaplets—why not investigate them now. Every precious second they can step up your production schedule—every "throw-out" they can eliminate from your production line—every single bit of extra strength and service they can add to your product—all help bring Victory sooner.

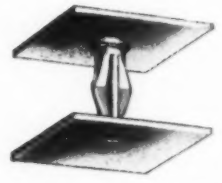
Our engineers are at your service without obligation.

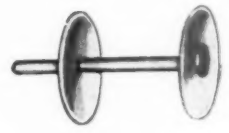
*Ask for the Fanner catalog—*
*if you haven't a copy on hand.*

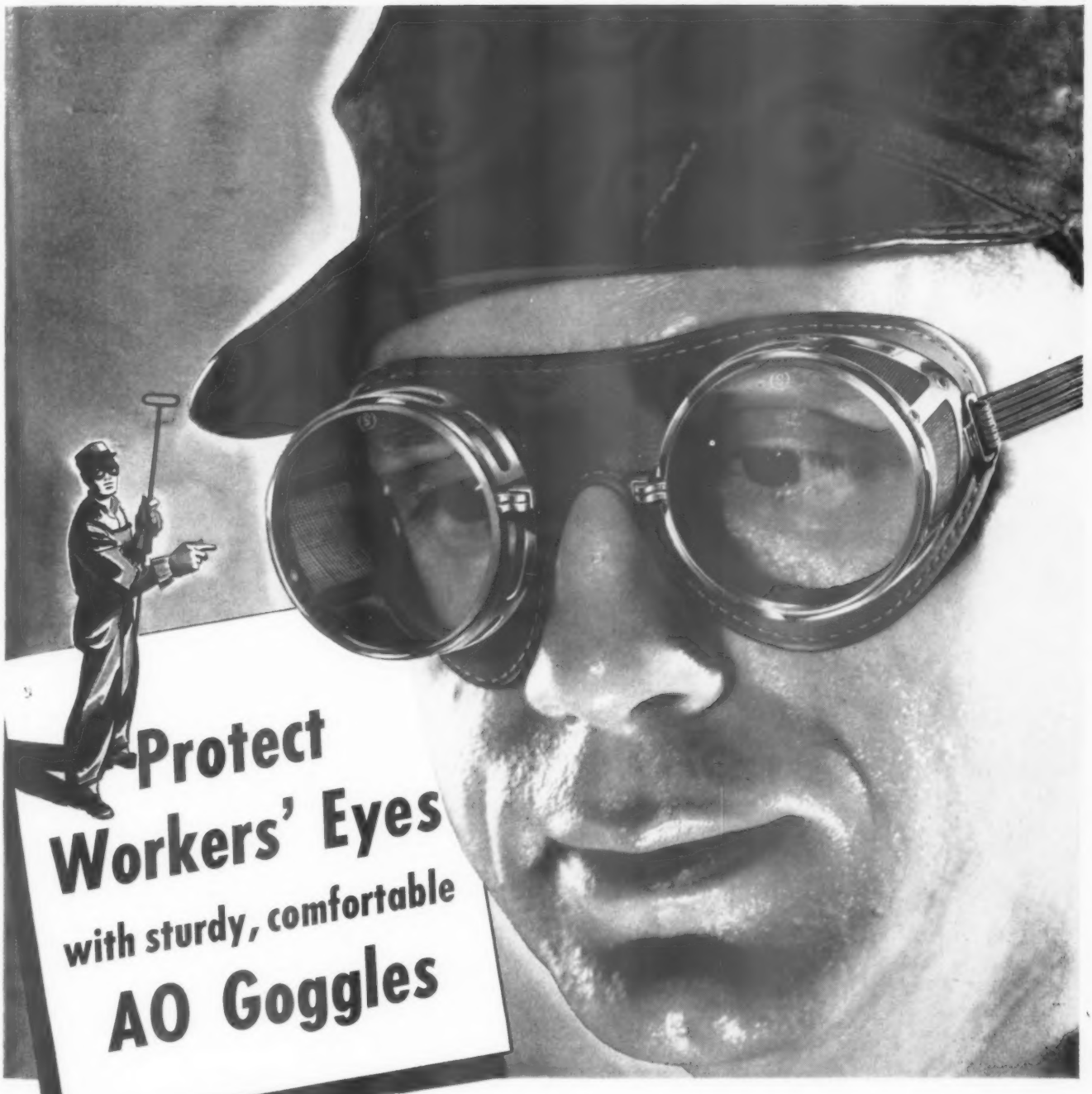
**The**
**FANNER MANUFACTURING COMPANY**
**Brookside Park** **Cleveland, Ohio**

The Canadian Fanner Ltd., Hamilton, Ontario, Canada

# FANNER CHAPLETS







# Protect Workers' Eyes with sturdy, comfortable AO Goggles

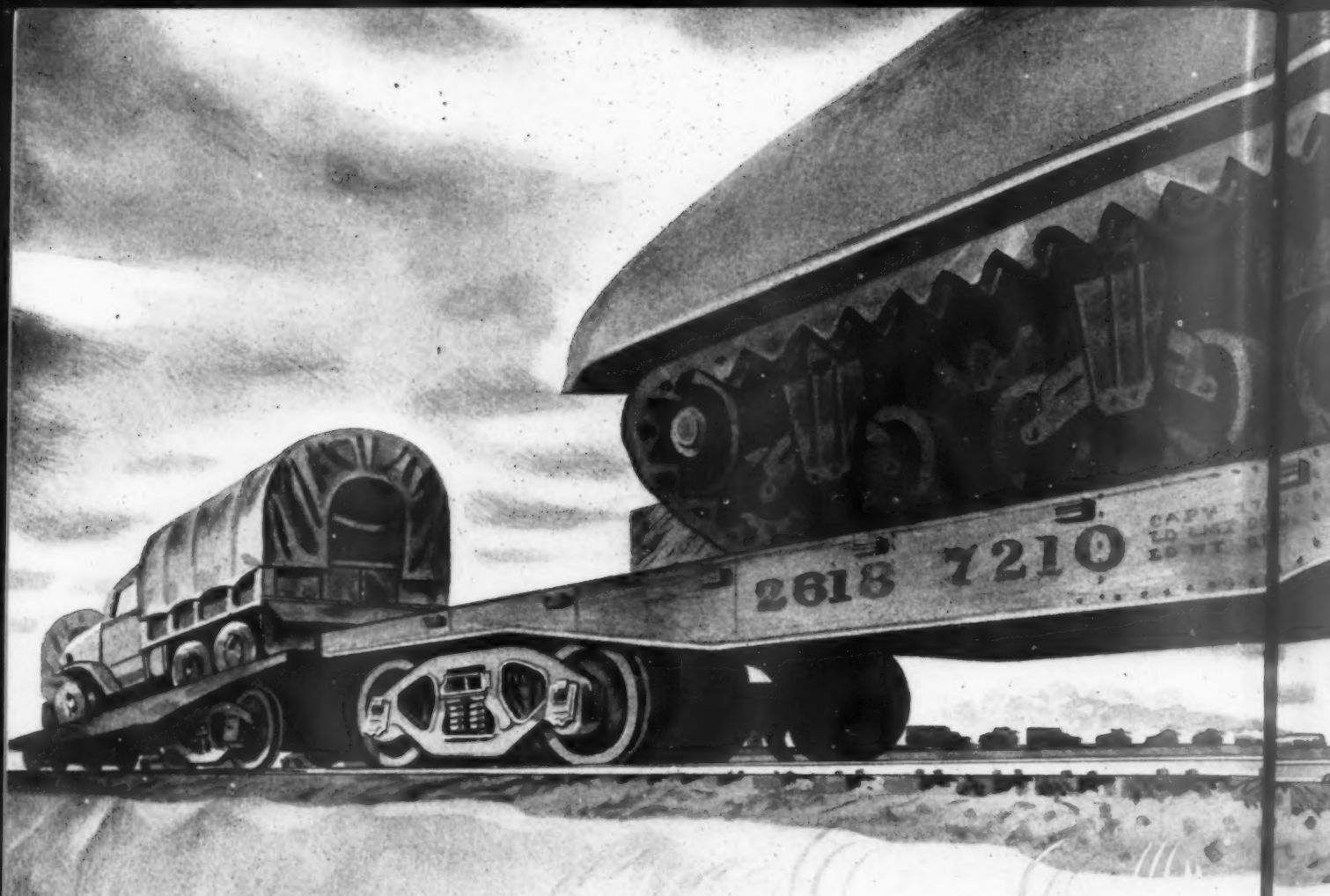
N.F.A. and N.A.S.O. Goggles, made by American Optical Company and supplied directly to you, offer maximum possible impact-resistance . . . and they're comfortable to wear.

These safety goggles, designed especially for foundrymen, have Super Armorplate Lenses . . . available in either clear glass or glare-resistant Calobar.

Remember, too, these comfort features: pliable leather masks for snug fit . . . perforated, clear acetate side screens around the eye cups for ample ventilation . . . adjustable elastic headband. Get in touch with your AO Safety Representative today.

American Optical
COMPANY
SOUTHBRIDGE, MASSACHUSETTS

SAVE MANPOWER FOR WARPOWER BY PROTECTING WORKERS' EYES




# *Plenty*...and On Time

HUNDREDS, thousands, tens of thousands of miles, the railroad rolling stock of the nation is speeding vital materials of war without rest nor letup. Never before have the railroads tackled such a job. Never have they done a big job better.

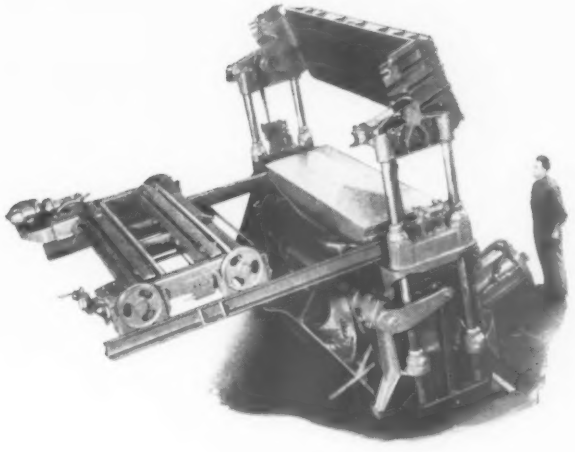
It's a tribute not only to the roads, but to the equipment builders, that the tremendous burden of wartime transportation has been shouldered so successfully. One of the foremost in this field is Symington-Gould Corporation, Rochester and Depew, N. Y., well-known manufacturer of car trucks, couplers and other railway equipment.

The Symington car truck shown at the right is typical of the precise, thorough engineering that means long life with a minimum of maintenance even under today's severe service conditions. Moulds for the highly accurate, uniform cast-steel sideframes and bolsters of Symington trucks are produced efficiently and fast on Osborn Moulding Machines.

**THE OSBORN MANUFACTURING COMPANY**

*5401 Hamilton Avenue* *Cleveland, Ohio*

**OSBORN**

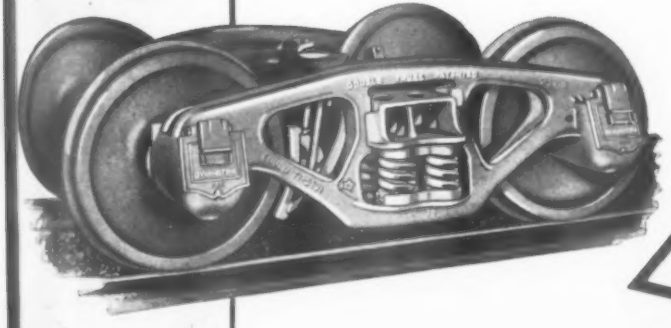


HIGH volume output of moulds that produce uniformly accurate, sound steel castings . . .

These are the basic requirements of the moulding job at Symington-Gould Corporation, where production of railway car trucks for our all-important war transportation is operating under forced draft.

The big Jolt, Rollover, Pattern-draw machine shown above is typical of the batteries of Osborn Moulding Machines that are helping Symington to get the job done.

**Precision and Production**—High speed, close tolerance, uniform moulding are Osborn characteristics that are enabling hundreds of foundrymen to supply their country with enough and on time.



*THE OSBORN MANUFACTURING COMPANY*
*5401 Hamilton Avenue Cleveland, Ohio*

**OSBORN**

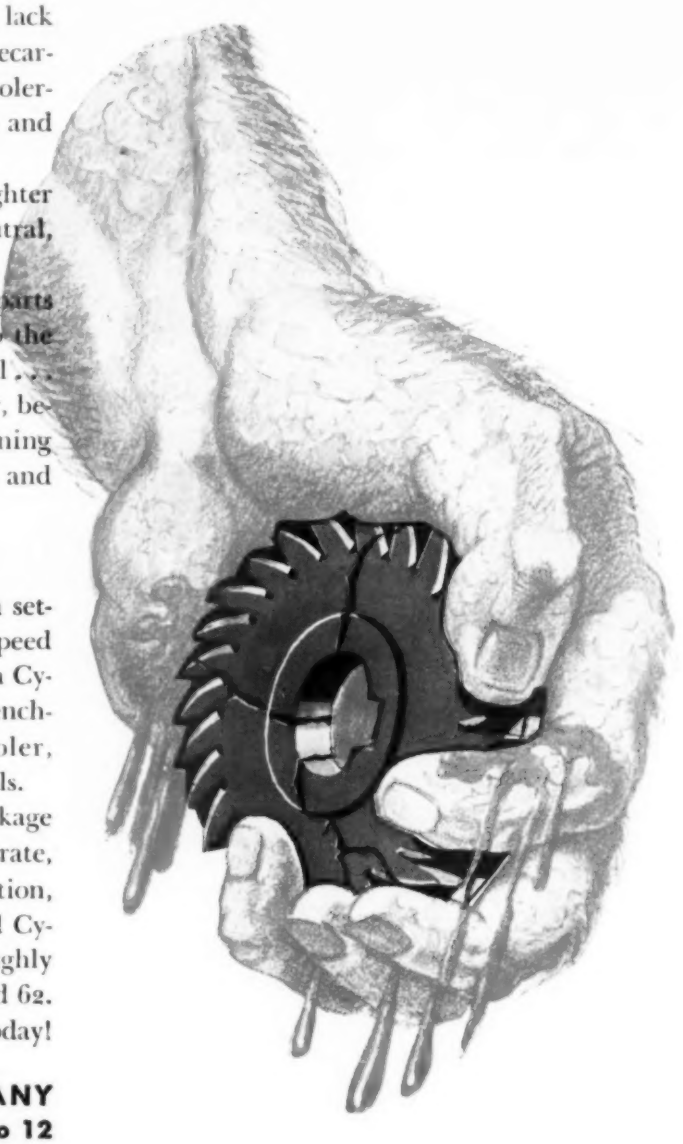
**MOULDING MACHINES**

# Is *Murder* being plotted in your toolroom heat treat department?

OFTTIMES the death of a tool or die is unwittingly plotted in the sweat and flame of the heat treating department. Scale kills the tool for lack of uniform hardness. The "soft skin" of decarburization robs the surface of necessary tolerances. Carburization leads to fatigue cracks and part failure.

You *can* put a stop to the unnecessary slaughter of tools and dies. You can do it with the neutral, controlled atmosphere of Hydryzing.

The clean uniform hardness of Hydryzed parts insures the precision planning you put into the job . . . it justifies the careful selection of steel . . . enhances the craftsmanship of the toolmaker, besides saving you the expense of costly cleaning operations such as sandblasting, pickling and polishing.



### HEAT TREATING IN A PACKAGE

LINDBERG can supply a complete toolroom setup, including a preheat furnace, high speed furnace (both with Hydryzing atmosphere), a Cyclone Toolroom Tempering Furnace, and quenching equipment complete with tank, cooler, circulating pump, and temperature controls.

Lindberg toolroom heat treating in a package gives you clean, uniform hardness with accurate, low-cost tempering. The advantages, operation, sizes, and types of Hydryzing hardening and Cyclone tempering furnaces are more thoroughly explained and illustrated in Bulletins 94 and 62. Insure your tool and die production. Write today!

**LINDBERG ENGINEERING COMPANY**
**2453 West Hubbard Street • Chicago 12**

**LINDBERG FURNACES**

ARMY E NAVY

**SUPER-CYCLONE for hardening, normalizing, annealing, tempering**
**CYCLONE for accurate, low-cost tempering and nitriding**
**HYDRYZING for scale-free and decarb-free hardening**

# OVER 40 YEARS OF U·S·G RESEARCH GIVES YOU THESE

# *Proven Foundry Products*

War has placed new demands for speed and perfection on patterns and castings. To meet these needs, U·S·G has broadened its line of plasters developed especially for the foundry industry. Each of the products listed below performs a particular service—helping make castings smoother, more accurate and economical.

## FOR THE PATTERN SHOP

**HYDROSTONE***—The hardest gypsum cement known. Most economical material for low cost cope and drag.

**HYDROCAL* A-11**—Controlled low-expansion, high-strength material for extremely accurate reproduction.

**HYDROCAL WHITE**—High early strength and controlled setting.

**HIGH EXPANSION HYDROCAL**—Especially designed for shrinkage recovery on mock-ups.

**INDUSTRIAL MOULDING PLASTERS**—For general work where strength and expansion control are not paramount.

## FOR NON-FERROUS CASTING

**MET-L-MIX***—Completely formulated metal casting plaster for non-ferrous castings; ideal for pressure-cast aluminum match plates. Higher permeability, faster calcination and uniform calcination.

**KASTICAL***—Completely formulated Hydrocal Base metal casting plaster for making zinc base alloys such as "Kirksite A." Produces smooth, velvet-faced castings, dimensionally accurate.

**METAL CASTING BASE PLASTERS**—Especially manufactured high-consistency plasters to meet customer's specifications.

## TECHNICAL SERVICE

U·S·G has a staff of practical, experienced men who will gladly discuss your problems with you and explain how they are increasing production; how they produce accurate castings that require a minimum of finishing; how you can broaden the scope of your production. For further information send in the coupon below.

*Trademark

*Industrial Sales Division*

UNITED STATES GYPSUM

300 WEST ADAMS STREET, CHICAGO, ILL.

*This famous trademark identifies products of United States Gypsum Company—where for 40 years research has developed better, safer industrial products*

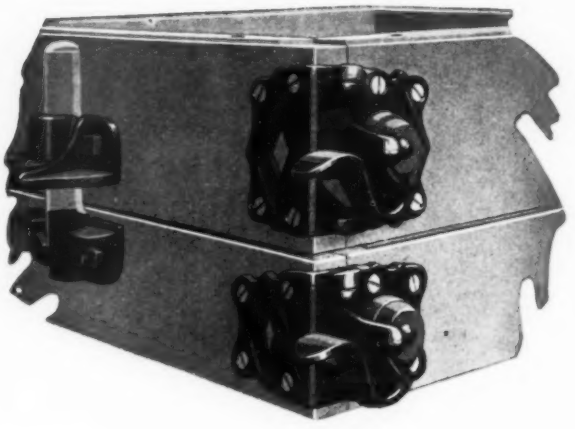
United States Gypsum Company, Dept. F. 9-43
300 W. Adams Street, Chicago, Ill.

Please send me literature on your foundry products.
Please have your Field Engineer call.

*Name* .....

*Address* .....

# A *Real* INVESTMENT FOR MORE PRODUCTION!

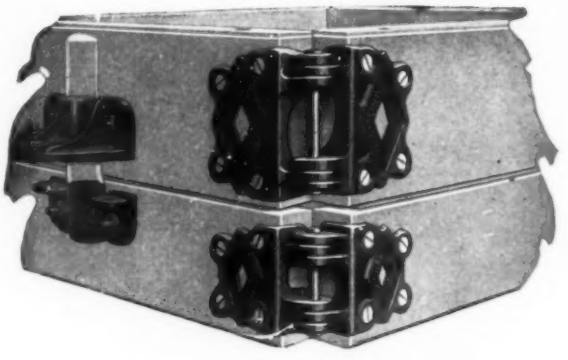


## DIAMOND FLASKS

*No matter what happens*—you'll never be wrong if you equip for production with *good* flasks. Because we can give you many exclusive features in a flask developed over a period of 50 years, it can also be said that, "You can't go wrong on a Diamond," either. Note these important features:

- **A SUPERIOR LATCH (exclusive)**

  It's self-compensating for wear. The tighter you draw it, the firmer the grip. Has special cam which is easily adjustable as extreme wear on parts develops. Only *Diamond* has this patented feature.



- **PRECISION-MADE**

  Made from the finest grade of well-seasoned cherry stock, all flasks are made to precise measurements according to your specifications.

- **A PATENTED HINGE (exclusive)**

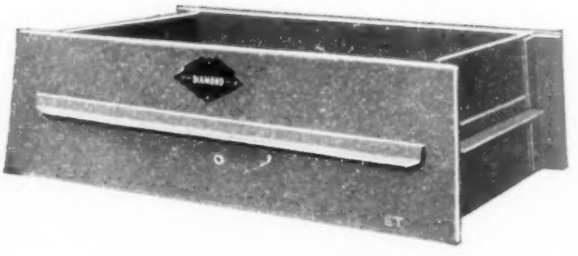
  Note the construction of Diamond hinges. The lugs are carefully milled and are interlocking which eliminates "play" no matter how long or how hard the flask is used.

- **SPECIAL SHAPES**

  We regularly supply customers with special shape flasks, including round flasks, and special cut partings.

## STEEL JACKETS

Made from Nos. 7 to 10 gauge steel, true to size and taper. Are practically indestructible, and retain their shape under severest conditions. Thousands of these jackets in use.



# DIAMOND

## CLAMP AND FLASK COMPANY

**Telephone 2553** **Richmond, Indiana**

***Designers of* CORE PLATES, JACKETS, BANDS, FLASKS *since 1889***

# Today

## Only the best conditioned sand is good enough.....

Model "ND5"
Capacity: 800
to 1,000 lbs.
per minute.

Cast parts for a class of ships which are making it tough for our enemies will be molded with the sand which is being shoveled into the hopper of the Royer in the view above. These castings are of better-than-acceptance standards, as all castings which are used in the war effort should be. Properly prepared sand is a prime requisite to good castings, minimum cleaning time and discount, and maximum output.

In over 5,000 foundries, including those most active in war production, sand conditioning is no longer a problem, as it is taken care of by the Royer Sand Separator and Blender. There's a model for every foundry.

THE ROYER

**ROYER FOUNDRY & MACHINE CO. KINGSTON, PA.**

# Power Operated Electrode Clamps

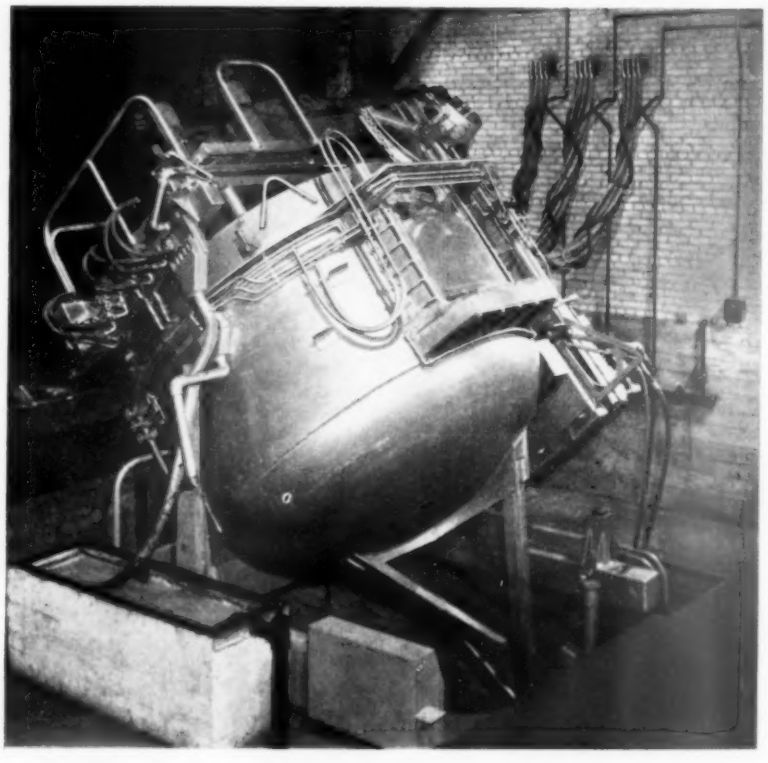
The Hydro-Arc electric melting furnace has power operated electrode clamps. The electrodes are slipped from the floor. Men are not required to get on top of the furnace. Also it is the only electric melting furnace having hydraulically positioned electrodes.

## *Many Advanced Features*

These are two of the many advanced features of the Hydro-Arc Electric Melting Furnace. It has a record of especially low operating costs . . . it has low carbon pick up . . . low electrode and power usage.

Low inertia counterbalancing and small reversing pump motors (which do not surge above their full current rating) result in (1) highest electrode speeds on automatic control, (2) most accurate positioning. The electrodes start and stop instantly in cooperation with the new automatic controls. There is less surging . . . improved power factor and less transformer heating.

Write for more information about what has been called "The most important development in electric furnaces in the past twenty years".



Size 12 MT Top Charge Electric Furnace

**HYDRO-ARC**
**FURNACE CORPORATION**

**561 HILLGROVE AVENUE, LAGRANGE, ILLINOIS** (A Suburb of Chicago, Illinois, U. S. A.)
TELEPHONES: LA GRANGE 4545 and 4546 CHICAGO LINE: ENTERPRISE 1068

Associated with Whiting Corporation

# Today—

**DAVENPORT**
**Modern Molding Machines**
**are helping to build . . . .**
**TANKS — PLANES — SHIPS — GUNS**

*Pin-Lift No. 24 Model AJS*

*Pin-Lift No. 24 Model Portable AJS*

# Tomorrow

The Foundries of America will be faced with a new and entirely different problem . . . a problem that will mean competition with world markets . . . a problem that will call for every ounce of American ingenuity . . . a problem that will call for quality Steel, Malleable and Gray Iron Castings, also Magnesium and other Non-Ferrous metals, at world competitive, governed prices.

## TOMORROW . . .

Can mean twenty-four hours, six months, or even a year or two, but now is the time to prepare your foundry for TOMORROW.

### "DAVENPORT" LINE OF MOLDING MACHINES

JOLT ROLLOVER DRAW MACHINE
Model SA (Seven sizes)—Capacity from 750 to 12,000 lbs.
Model A (Six sizes)—Capacity from 1,000 to 12,000 lbs.

JOLT PIN-LIFT OR PUSH-OFF MACHINES (*With Adjustable Lift Pins*)
Six sizes—Capacity from 1,000 to 10,000 lbs.

PLAIN JOLT MACHINES
Fourteen sizes—Capacity from 200 to 25,000 lbs.

Send for our catalog. Choose modern equipment. Although deliveries are slow, place your order today. Be prepared for peace.

# DAVENPORT MACHINE & FOUNDRY CO.

DAVENPORT IOWA, U. S. A.

BRASS INGOTS BRONZE
RIVER RS BRAND
LEAD TIN COPPER
Producers of
BRASS & BRONZE INGOT
SOLDER
BABBITT
PATTERN METAL
Distributors of
INGOT COPPER
PIG TIN
PIG LEAD
The RIVER SMELTING & REFINING CO.
P.O. BOX 5755
CLEVELAND, OHIO
TELEPHONE: FLORIDA 3040

# 4 TIMES MORE ILLUMINATION
## FOR VIEWING INDUSTRIAL RADIOGRAPHS

# KELEKET *High Intensity* ILLUMINATOR

THE two illustrations above show the same X-ray film viewed first on an ordinary illuminator and then on the KELEKET High Intensity Illuminator. Arrows indicate the critical areas that pass unseen on the ordinary illuminator even though they definitely exist on the film, and can be seen with adequate illumination.

The KELEKET High Intensity Illuminator provides a full 14″x17″ front surface that allows the largest films to be viewed at one glance. With smaller films masking reduces the illuminated front to the desired size. For detailed inspection of *any critical area* the 3″ spot is used, where 4 times the intensity of the large front surface easily illuminates films up to density 4.5.

Illumination on both the 14″x17″ surface and the 3″ spot is controlled by a stepless voltage regulator which selects any degree of intensity desired from zero to the maximum.

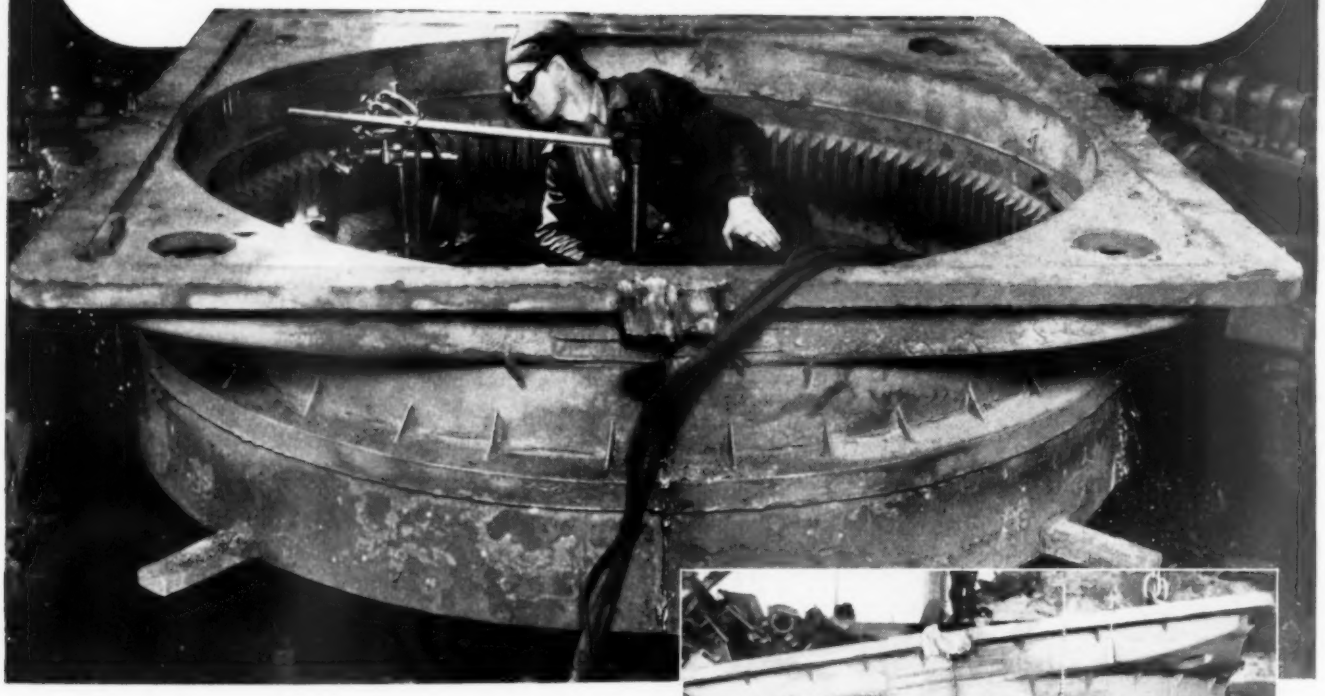
For more detailed information write for Catalog F-11.

KELLEY-KOETT X-RAY MFG. COMPANY
2279 WEST FOURTH ST., COVINGTON, KY.

PIONEER CREATORS OF *QUALITY* X-RAY EQUIPMENT SINCE 1900

# SPEED RISER CUTTING

## *CONSERVE MANPOWER—SAVE GRINDING*



The completed cut on this big internal gear casting is remarkably smooth and clean. Considerable time and expense was saved by the use of an Airco gas cutting machine.

REMOVING the riser on this internal gear casting at Maynard Electric Steel Castings, Milwaukee, Wisconsin, is a fast operation. Using an Airco Radiagraph gas cutting machine, the casting—measuring 105" in diameter and 5" in thickness—is trimmed at a speed of 5" per minute.

More important—the Airco Radiagraph cuts so close to final machining specifications that slow, expensive grinding is completely done away with and a costly production bottleneck is eliminated.

This actual "case history" demonstrates the advantages of removing gates and risers by machine gas cutting. Airco gas cutting machines are easily adaptable to any cutting requirement—straight line, circle, or bevel-edge cuts.

If you would like further details on how oxyacetylene processes can save time and cost in foundry operations, call or write your nearest Air Reduction office.

★ ★ ★

**Buy United States War Bonds**

# Air Reduction

**General Offices: 60 EAST 42nd ST., NEW YORK 17, N. Y.**

**IN TEXAS: MAGNOLIA AIRCO GAS PRODUCTS CO.**

**General Offices: HOUSTON, TEXAS**

**IDLE CYLINDERS ARE PRODUCTION SLACKERS: *Keep 'em rolling for victory!***

# The Air Compressor with 25 REASONS for Greater Dependability

SULLIVAN
"INDUSTRIAL-AIR"
24 Hour a Day
Heavy Duty Service
For Foundry, Factory, Mill and Plant of Small and Medium Size —For Special Service in Largest Plants

● The heavy-duty, Vertical "Industrial-Air" for smaller plants—or for special or auxiliary services in large plants—embodies most modern advances in design and manufacture, and sets new standards of performance. It is the *only* single-stage, double acting compressor that provides:

*Full force feed lubrication to all working parts, replaceable cylinder liners and crosshead guides, anti-friction main bearings, Sullivan's own exclusive long-life "Dual-Cushion" Valves and greater capacity per foot of floor space. Eleven different sizes with displacements from 153 to 822 C.F.M. and pressures from 30 to 150 lbs.*

It has 25 outstanding features of construction... features of dependability... features you should know... features told at length in Catalog A-43. Write your nearest Sullivan branch office *today*. SULLIVAN MACHINERY COMPANY, Michigan City, Indiana. *In Canada:* Canadian Sullivan Machinery Co., Ltd., Dundas, Ont.




# SULLIVAN

## AIR · COMPRESSORS FOR EVERY PURPOSE

**PRODUCTS**

STATIONARY AND PORTABLE AIR COMPRESSORS FROM ¼ TO 3000 H. P., PNEUMATIC CASTING GRIPS, FOUNDATION BREAKERS, PORTABLE HOISTS, ROCK DRILLS.

**OFFICES**

| | | | | |
|---|---|---|---|---|
| Seattle | Portland | San Francisco | Los Angeles | Salt Lake City |
| Boston | Pittsburgh | Birmingham | Duluth | Scranton |
| New York | St. Louis | Knoxville | El Paso | Denver |
| Chicago | Detroit | Huntington | Butte | Dallas |

# HAYNES *equipment*

## BRASS FURNACES

Tilting or stationary. Simple cover lifting mechanism, 2" cold rolled shaft, cast steel cross head, 3/8" rods and turnbuckles for adjusting cover. Made in any size required. 6" machined trunnions rest in chilled face bearings in the legs which are bolted to channel iron base braced with steel bars to eliminate side motion. Gear box and gears adjustable to take up any loose play due to wear. Furnace is complete welded shell equipped with special Haynes burner designed to save nearly one-fourth your oil. Equipped with a General Blower unit.

## JOLT SQUEEZER

This machine has a 10" squeeze cylinder, 3" jolt cylinder, 17" x 20" jolt table. Sturdily built throughout—no bolts or screws. Post and jolt cylinder cast in one piece. Arm swings on 2-7/16" cold rolled shaft. Zerk fittings on all moving parts. Comes completely equipped with vibrator, riddle rack, set-off board, air gauge, pop-off gauge and pin for gate horn.

## WORM GEAR LADLES

Haynes Worm Gear Ladles are manufactured in all sizes. Welded bowls, cast steel trunnions with "V" bail. Gears completely enclosed. Zerk fittings on all moving parts. Bail is made from 3" x 1" steel.

## CORE OVENS

The Haynes Core Oven has 2" insulated walls. Front, top and bottom pressed steel eliminating breakage. Cast iron fire box for Coke, Oil or Gas. Five rolling shelves, one 10" high and four 7" high. Shelves make complete half turn closing oven while shelves are being loaded. Height 51", width 54", greatest depth of shelf 27". Weight approximately 900 lbs. Firebox height 16", depth 15", width 14".

*Send for detailed information and prices. Prompt deliveries.*

## HAYNES FOUNDRY EQUIPMENT CO.

**1734 LAKE STREET** **KALAMAZOO, MICH.**

### EXTRA PROTECTION OUTSIDE

The cast iron frame and end shields are so constructed that the internal working parts of the motor are fully protected from falling dirt or dripping liquids.

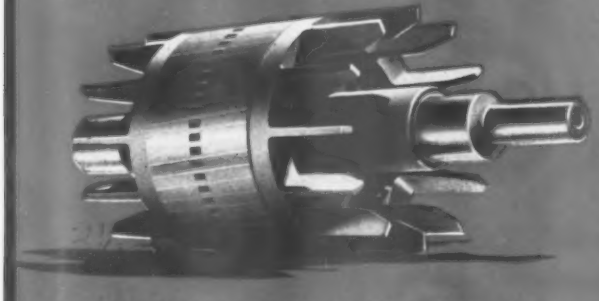
### EXTRA PROTECTION INSIDE

Windings are protected from unusual moisture or dirt conditions by special "baked in" insulation treatment which greatly increases the life of the motor.

# MASTER ELECTRIC MOTORS

## 1/10 TO 100 HORSEPOWER

THE MASTER ELECTRIC COMPANY • DAYTON, OHIO



### EXTRA RUGGED CONSTRUCTION

Unusually heavy alloy steel shafts and oversize bearings add greatly to the durability of Master Motors. In Squirrel Cage motors the rotor windings are cast integral with the rotor laminations.

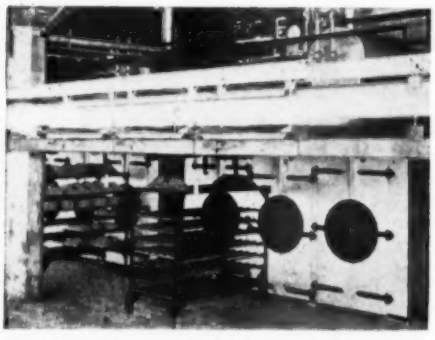
### EXTRA FREEDOM FROM VIBRATION

The rotor of every Master Motor is dynamically balanced to eliminate noise and destructive wear due to vibration from an out-of-balance condition.

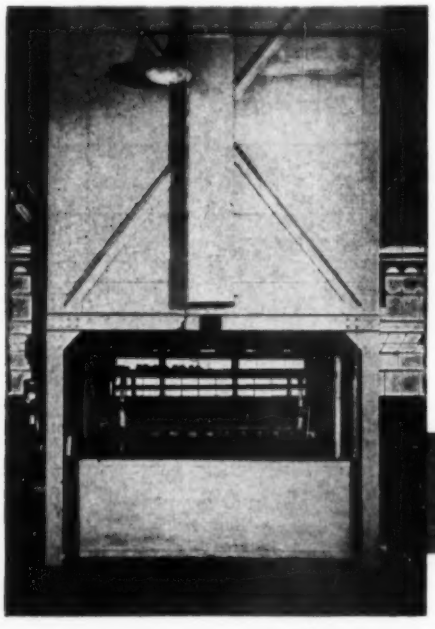
# Outstanding SERVICE draws important customers for CARL-MAYER OVENS

Core and mold ovens hold a position of real responsibility. They dictate the speed and character of casting production. It is therefore, a high tribute to Carl-Mayer Ovens to be chosen repeatedly by America's foremost foundries, in face of wide competition.

Consult a Carl-Mayer Engineer, or write for Bulletin 141.



Part of large Carl-Mayer Recirculating Gas Fired Rack Type Oven installation at The General Electric Co.



Typical large Carl-Mayer Vertical Oven as installed for Electric Autolite, Fremont Foundry, Cadillac, General Motors, Packard Motor Co. and The General Steel Castings Corp.

Aluminum Co. of America
American Magnesium Corp.
American Radiator & Standard Sanitary Corp.
Babcock & Wilcox Co.
Bridgeport Brass Co.
Bucyrus-Erie Co.
Brown Industries Corp.
Dunkirk Radiator Co.
Eclipse Aviation Division of Bendix Aviation Corp.
Electric Autolite Co.
Ford Motor Co.
Fort Pitt Steel Casting Co.
Frank Foundries Corp.
Fremont Foundry Co.
G & C Foundry Co.
General Motors Corp.
The General Steel Castings Corp.
General Electric Co.
Gilbert & Barker Co.
International Heater Co.
Henry J. Kaiser Co.
Packard Motor Co.
Shenango Penn Mold Co.
Studebaker Corp.
Whiten Machine Works
Whiting Corp.

**CARL-MAYER CORE AND MOLD OVENS**

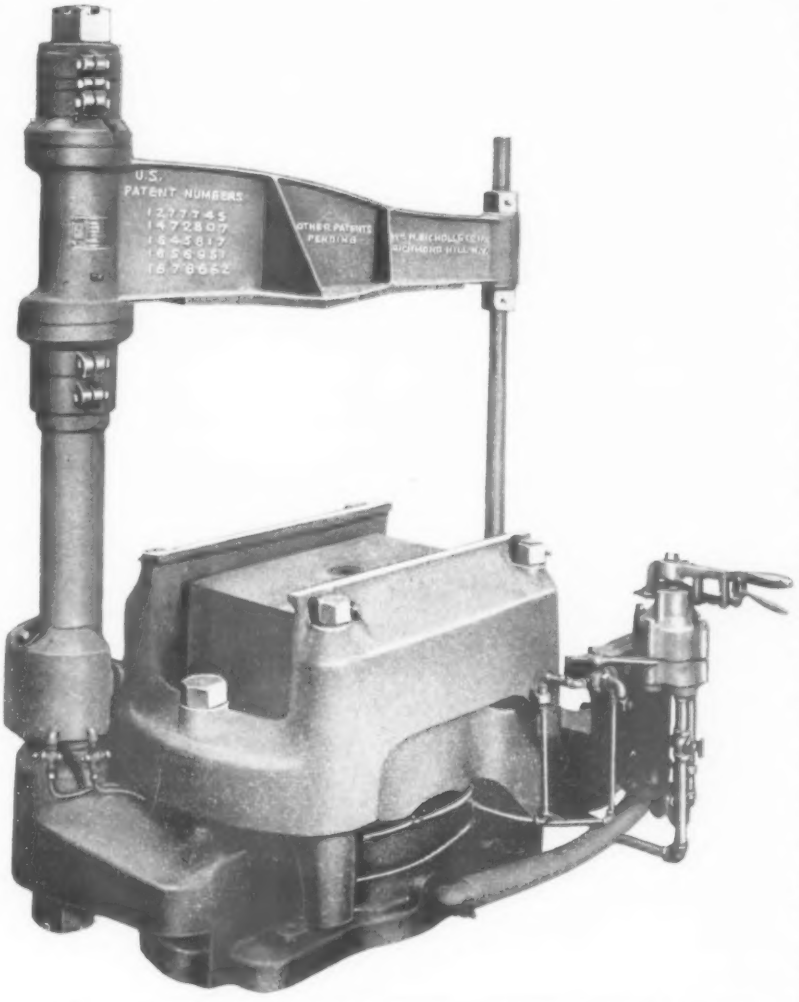
*all types all sizes all fuels*

**THE CARL-MAYER CORP., 3030 Euclid Ave., Cleveland 15, Ohio**

# MOLDING MACHINES

## FOR PEAK PRODUCTION

## FASTEST MOLDING...LOWEST MAINTENANCE




16-36 Type D Heavy Duty Jolt Squeeze Molding Machine with Pattern Drawing Device—Open End Frame—7″ diameter jolt piston—16″ diameter squeeze piston.

Redesigned to a minimum of working parts, thereby greatly reducing maintenance cost and at the same time lowering operating costs through saving of labor.

TODAY—More than ever—foundrymen must rely upon their molding equipment to meet war production schedules. They cannot afford to have a breakdown! These machines have played an important role in the success of many large foundries all over the world. This international acceptance is due to their ability to "stand up" under the heaviest production.

Our Type D Molding Machines are built in nine sizes.

We invite you to write for particulars on the NICHOLLS 1943 model production line of Molding Machines.

**Wm. H. NICHOLLS Co., Inc.**

RICHMOND HILL, LONG ISLAND, NEW YORK

Established 1910

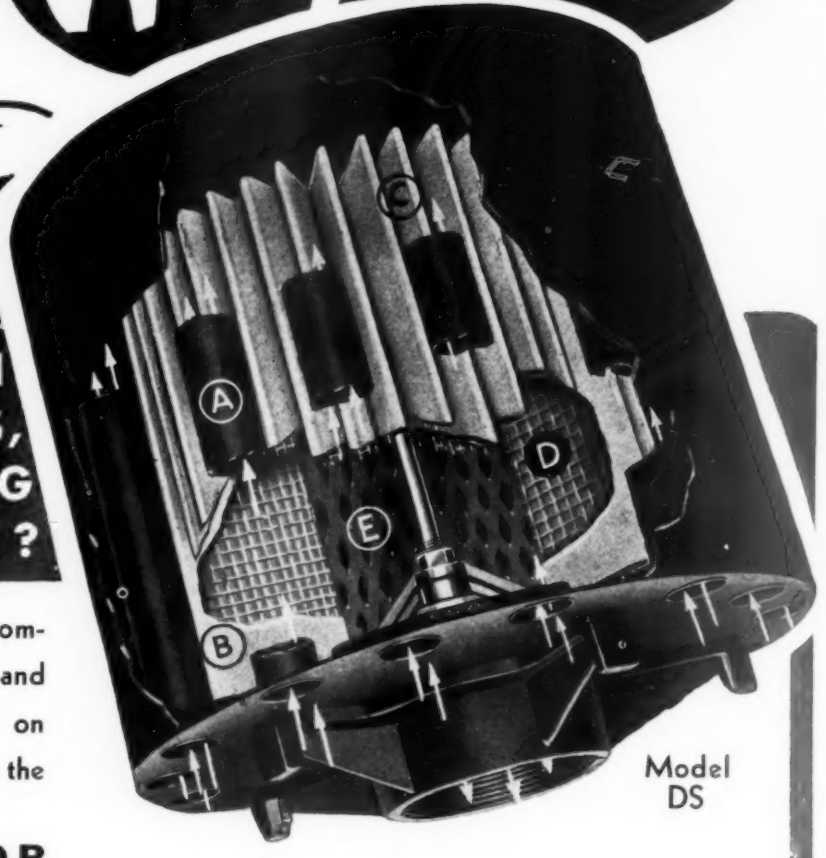
Foreign Manufacturers and Selling Agents—

For Continental Europe and Great Britain—The George Fischer Steel and Iron Works, Schaffhausen, Switzerland

# NICHOLLS

# Silent Night!?

## IS 24 HR. OPERATION OF COMPRESSORS, DIESELS, ETC., CAUSING COMPLAINTS ?????




Model DS

Are people near your plant complaining of noise at night? If so, and the noise is from the air intake on Diesels, compressors, etc., here's the solution:

## PROTECTOMOTOR
### SILENCER-FILTER FOR DIESEL ENGINE INTAKE

The Model DS Silencer-filter hushes the most raucous air intake—plus preventing the entry of abrasive foreign matter. It's a double duty filter—helping to prevent complaints due to night operation, saving excess wear on engines and compressors due to intake of abrasive dust. More than 750,000 Protectomotors of similar construction have been sold since 1920. Quickly and easily installed, the Model DS provides capacities and threaded or flanged connections for any engine or compressor.

**MODEL DS CONSTRUCTION FEATURES**

**A.** Series of cylindrical rectifying chambers of scientific diameter to length ratio which smooths out sound waves.

**B.** Dry Feltex Filtering Medium 99.8% efficient by University of California Laboratory tests.

**C.** Radial Fin Construction. Permits large area of filtering medium to occupy smallest possible space.

**D.** Rigid, galvanized mesh frame.

**E.** Reinforcing tube. The Model DS Protectomotor is "built like a battleship".

**Always Reduces Engine Wear — May Prevent a "Nuisance Action"**

**NEW CATALOG**
44 pages, completely illustrates and describes filters for ventilation and pipe lines as well as engine intake . . . . .

**STAYNEW FILTER CORP.**
36 Centre Park, Rochester, N. Y.
*"Air Filter Headquarters"*

PROTECTOMOTOR 99 9/10 Per Cent EFFICIENT AIR FILTERS

# What the world will need...

*- we are prepared to deliver*

BUY
WAR
BONDS
★

Industry has learned lessons in achieving lightness in war products that will later be applied to peace-time products. When light weight, combined with strength is desired, the use of Aluminum Alloys is a "must." Our large capacity, wide experience and ability to make alloys to your most rigid specifications, will enable us to care for all your requirements.

## ALUMINUM REFINERS

*Division of*

**BOHN ALUMINUM & BRASS CORPORATION · Detroit, Michigan**

*General Offices: Lafayette Building*

MANUFACTURERS OF ALL TYPES AND SHAPES OF CASTING AND DEOXIDIZING ALLOYS

# TAM ZIRCONITE PRODUCTS AVAILABLE

## TAM
**Foundry Zirconite Sand (in three grades)**
**Melting Points from 3650° F to 3950° F**

## TAM
**Foundry Zirconite Flour (in two grades)**
**Melting Points from 3650° F to 3812° F**

## TAM
**Foundry Zirconite Mold and Core Washes (in three grades)**
**Super-refractory compounds with melting points from 3600° F to 3775° F**

**GENERAL OFFICES AND WORKS: NIAGARA FALLS, N. Y., U. S. A.**
**EXECUTIVE OFFICES: 111 BROADWAY, NEW YORK CITY**

**Representatives for the Pacific Coast . . . BALFOUR, GUTHRIE & CO., San Francisco, Los Angeles, Portland, Seattle, Tacoma**
**Representatives for Canada . RAILWAY & POWER ENG. CORP., Ltd., Toronto, Montreal, Hamilton, Winnipeg, Vancouver, Sydney**
**Representatives for Europe . . . . . T. ROWLANDS & CO., Ltd., 23-27 Broomhall St., Sheffield, England**

# 30 YEARS OF SERVICE

August 1913. In a small room on the upper floor of the building pictured above the City Pattern Works started with 600 square feet of floor space. Since that time, we have steadily increased in size until today we have approximately 49,500 square feet.

Thirty years of service to a land we love to serve.

Yes, thirty years of service to a wartime as well as to a peacetime America.

Through world war number one, through the boom period and through the depression that followed we have steered a steady course, conservative, healthy, financially sound and consistent.

Throughout this period of steady advancement and growth we made service our watchword and expanded our facilities at every opportunity with an eye to the future and the best interests of those we served.

All this the good old City Pattern Works did well.

Since that warm Labor Day in September, Nineteen Thirteen when Vaughan Reid and Fred Coulton worked and sweated in their undershirts assembling their meager equipment and up to the present time, quality, precision and performance have kept pace with our steady enlargement of program and facilities.

H. A. Kelley came with us early in Nineteen Twenty-Four and today is General Sales Manager. He has been responsible to a major degree for many of the valuable contacts that have lasted through the years.

Art Bossert joined us in April 1927, and now is General Superintendent in charge of Production.

The President's son, Vaughan C. Reid, joined the Company in late Nineteen Thirty-Three and at present has charge of Research and Metallurgical Activities.

After much thought and discussion we have decided that our name should be more descriptive of our various products and services. Therefore, after thirty years of sincere strenuous effort we are now rededicating ourselves and all we have and hold to an even greater effort and responsibility to the future and we shall be known hereafter as City Pattern Foundry and Machine Co.

May we be blessed with the opportunity to serve our country and our many loyal friends for years and years to come.

WOOD AND METAL PATTERNS • KELLER AND DUPLICATOR WORK • MACHINE WORK • MALLORY METALS • BERYLLIUM COPPER • MONEL METAL • EVERDUR CASTINGS

COPPER CASTINGS OF HIGHEST ELECTRICAL CONDUCTIVITY

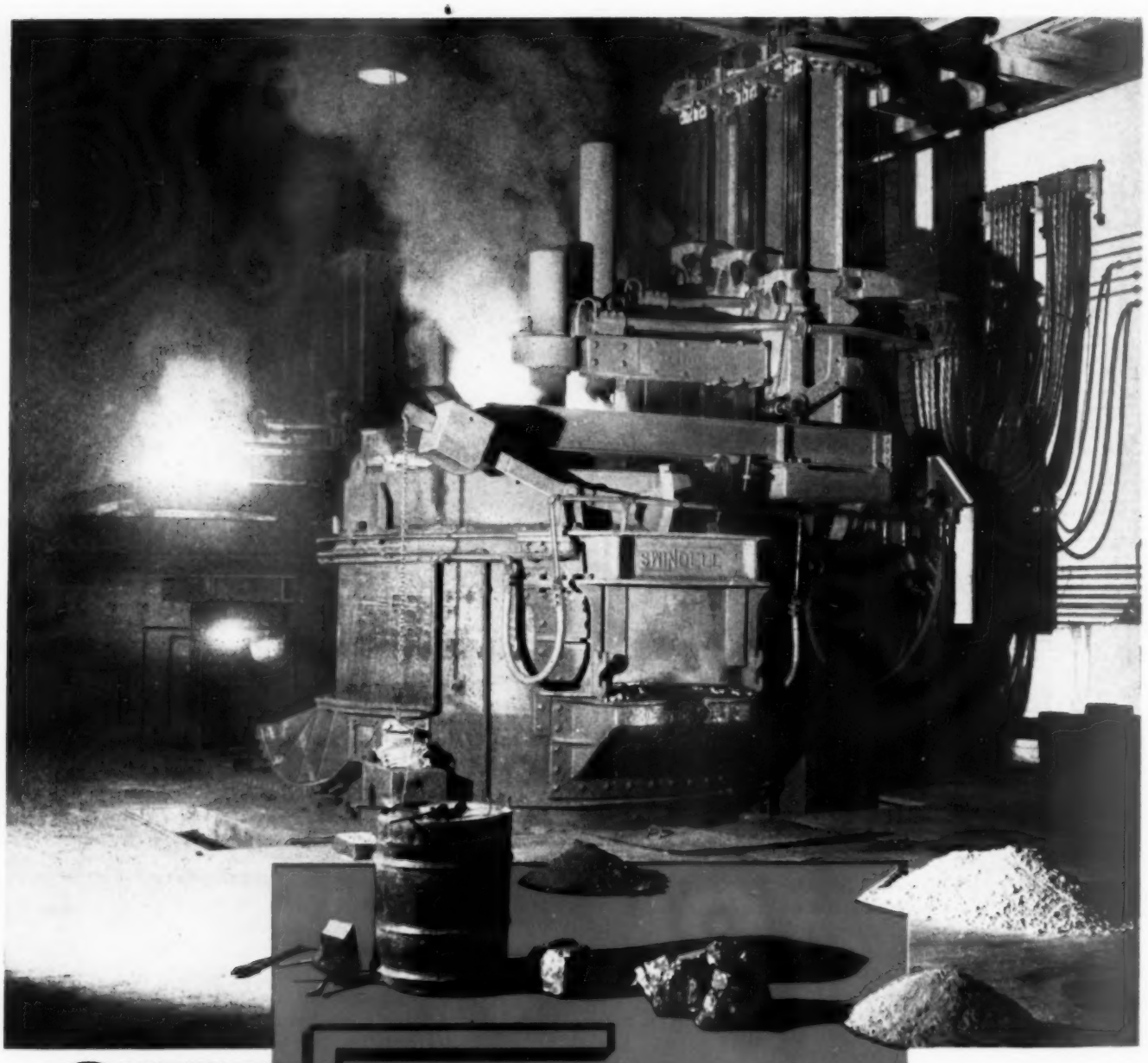
• • •

BRASS, BRONZE AND ALUMINUM CASTINGS

# CITY PATTERN

## FOUNDRY AND MACHINE CO.

1165 HARPER AVE. at RIVARD ST., DETROIT 11, MICH.



SWINDELL

*electric arc melting furnaces*

Bringing to the rapid war production of steel every *performance advantage* including

TOP CHARGING • SWINGING ROOF
4-POINT ROOF SUSPENSION

INTEGRATED CONSTRUCTION OF ROOF OPERATING MECHANISM

LET US CONSULT WITH YOU!

SWINDELL-DRESSLER *Corporation*

DESIGNERS AND BUILDERS OF MODERN INDUSTRIAL FURNACES

PITTSBURGH, PA.

# For Every Foundry Dust Control Problem

A

B

C

D

E

F

## SCHNEIBLE
## Standard Multi-Wash Units

Schneible units of standard design are adaptable to the successful control of every dust and fume condition encountered in foundries. Leading aircraft, automotive and war equipment production foundries and hundreds of jobbing foundries — large and small — have solved their dust problems with Schneible Multi-Wash systems.

In dealing with dust control, the equipment which does the most thorough job with minimum attendance and maintenance proves the most profitable in the long run. And there are profits involved — very definitely. *A clean foundry atmosphere induces highest efficiency in manpower with a minimum of lost time, and materially reduces the maintenance required on mechanized and electrical equipment.* Clean air pays dividends.

Schneible Multi-Wash Collectors use water or other liquid to wash dust and fumes from the contaminated air. The collected matter, as sludge, flows to a dewatering tank (or waste). The sludge settles out and clear water is recirculated in the collector.

In operating and maintenance costs, Schneible Systems are the absolute low. No attention is required. There is no dust to dispose of; nothing to break, burn, clog or rapidly wear.

Schneible Multi-Wash Collectors are made in types and sizes for every foundry, for an entire plant or for individual operations. Schneible also makes all the auxiliary equipment, including "Uni-Flo" dust hoods, dewatering tanks and systems, "Wear-Proof" pumps, ventilated benches and special equipment for magnesium operations. May we send you informative bulletins?

**CLAUDE B. SCHNEIBLE CO.**
**3953 Lawrence Ave., Chicago**
**Engineering Representatives in Principal Cities**

A—Senior Collectors. Capacities to 30,000 c.f.m. and multiple units.

B—Junior Collectors. Suitable where the high efficiency of the Senior collector is not required.

C—Unit Type Collectors for individual or isolated operations.

D—Dewatering Equipment. Tanks and systems in all sizes. Product recovery is provided.

E—"Uni-Flo" Hoods. Remove dust and fumes with minimum air volume.

F—Multi-Wash Ventilated Work Benches. Self-contained, meet dust removal needs of bench operations.

# SCHNEIBLE

# Your Bond Selling Responsibilities Double!

Starting September 9th, your Government will conduct the greatest drive for dollars from individuals in the history of the world—the 3rd War Loan.

This money, to finance the invasion phase of the war, must come in large part from individuals on payrolls.

*Right here's where YOUR bond selling responsibilities DOUBLE!*

For this extra money must be raised *in addition* to keeping the already established Pay Roll Allotment Plan steadily climbing. At the same time, every individual on Pay Roll Allotment must be urged to dig deep into his pocket to buy *extra* bonds, in order to play his full part in the 3rd War Loan.

Your now *doubled duties* call for these two steps:

1. If you are in charge of your Pay Roll Plan, check up on it at once—or see that whoever is in charge, does so. See that it is hitting on all cylinders—*and keep it climbing!* Sharply increased Pay Roll percentages are the best warranty of sufficient post war purchasing power to keep the nation's plants (*and yours*) busy.

2. In the 3rd War Loan, every individual on the Pay Roll Plan will be asked to put an *extra two weeks salary* into War Bonds—over and above his regular allotment. Appoint yourself as one of the salesmen—and see that this sales force has every opportunity to do a real selling job. The sale of these *extra* bonds cuts the inflationary gap and builds added post-war purchasing power.

Financing this war is a tremendous task—but 130,000,000 Americans are going to see it through 100%! This is their own best *individual* opportunity to share in winning the war. The more frequently and more intelligently this sales story is told, the better the average citizen can be made to understand the wisdom of turning every available loose dollar into the finest and safest investment in the world—United States War Bonds.

★ ★ ★

## BACK THE ATTACK With War Bonds!

*This space is a contribution to victory today and sound business tomorrow by THE FOUNDRY*

# 80 Miles per Hour

# 80 MOLDS per Hour

**Driving your automobile 80 miles per hour is OUT for the Duration, but there's no law against producing 80 molds per hour in your foundry. Such remarkable production record CAN be achieved, and IS being achieved, in foundries equipped with Milwaukee Jolt Squeeze Rollover Draw Machines. These sensational rollover machines perform with a completely simplified operating cycle to obtain maximum speed, yet maintaining amazing accuracy and precision under the most difficult foundry conditions. Ideal for all types of production or semi-production work. Write for descriptive bulletin.**

Let a Milwaukee Foundry Equipment Engineer show you how to apply this faster, more modern machine to your present molding requirements.

## MILWAUKEE FOUNDRY EQUIPMENT CO.

238 WEST PIERCE STREET • Cable Address "MILMOLDCO" • MILWAUKEE, WISCONSIN

# *"This is a Grinding War . . ."*

*Copyright 1892 and 1920 by Harper & Bros.*

## FIGHTING TOP-

A terror in its day was the Gatling gun, shown here in the fighting top of an 1892 battleship. It was good as guns went then, when there was no such thing as production grinding, but modern weapons leave it far behind.

***How did our fighting equipment make such progress in so few years.***

Give a pat on the back to those who dreamed up the new designs—and to the far-seeing men who spark-plugged research in years of peace as well as war. Much credit, however, for the development of our precision ordnance must go to American mass production methods. But without grinding methods and processes, mass production as we know it could not exist.

Take the modern anti-aircraft gun. Every moving part must be ground to split-hair precision. It is this precision which enables the gun to fire with such deadly accuracy, so rapidly and so continuously.

And this goes for every other piece of fighting equipment, too. Every moving part in the engines which carry a plane, tank, truck, jeep, sub or ship into battle must be ground to closest tolerances.

***Grinding is on the job even before production of these weapons begins.***

The cutters, reamers, drills and broaches of machine tools that *make* machines of war must also be ground to close limits.

Carborundum has helped to develop many modern grinding processes in the past. And today, because "this is a grinding war," our engineers, research men—*all* of the men and women of Carborundum are working with redoubled energy.

Their contribution to the war effort received official recognition when the men and women of Carborundum were recently awarded the Army-Navy "E" Production Award. And they stand ready to make a similar contribution toward a better world of peace.

* * *

***Every hour this war is shortened will save $12,000,000. The lives it will save are priceless. So please remember that grinding wheels, too, are "Weapons for Production" . . . use them wisely to help end the war sooner.***

***The Carborundum Company, Niagara Falls, New York.***

# THE CARBORUNDUM COMPANY

CARBORUNDUM AND ALOXITE ARE REGISTERED TRADE-MARKS OF AND INDICATE MANUFACTURE BY THE CARBORUNDUM COMPANY

# To the FOUNDRYMEN of tomorrow

## PLUMBAGO

Plumbago is the popular name used in foundries to describe the refractory material rubbed or brushed on sand molds.

Plumbago is also commonly called Graphite, Silver Lead and Blacking.

Plumbago produces better casting surface and reduces cleaning costs. It peels the sand from the casting.

The sand mixture is the foundation for Plumbago. There are many sand mixtures, having different grain size, different clay content, different moisture, etc.

J. S. McCormick Co. makes Plumbago to suit any sand mixture.

McCormick Plumbago is easy to apply and stays on the sand until the casting is set.

**J. S. McCORMICK COMPANY**

25TH STREET AND A. V. R. R.

PITTSBURGH 14, PA.

SILVER KING PLUMBAGO — SUPERIOR PLUMBAGO — MATCHLESS PLUMBAGO

# THE NEW *Ransohoff* CATALOG IS READY *for you!*

**Generously illustrated with photos of actual installations . . . filled with important data for foundries, large or small . . . and here's its message:**

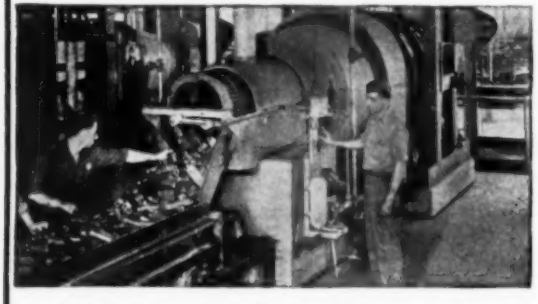
## THE RANSOHOFF WET METHOD
SAVES 30% to 70%
ON YOUR
CLEANING COSTS

Side-loading, side-unloading wet mill. A hot solution is pumped through the mill while tumbling; clear rinse solution pumped through while stars are returning. Castings discharged on chute to sorting table.

**Send for your personal copy today, please. It belongs at your elbow as your best help to the solution of your cleaning problems.**

Tumbling piston rings castings after molding and before machining, about 20 minutes per batch. Additional screen for separating polywogs or risers. Same mill used also in production and job foundries.

End-loading, end-unloading wet mill cleaning grey iron pipe fittings. Discharges directly onto sorting table. Power loaders below floor level for loading.



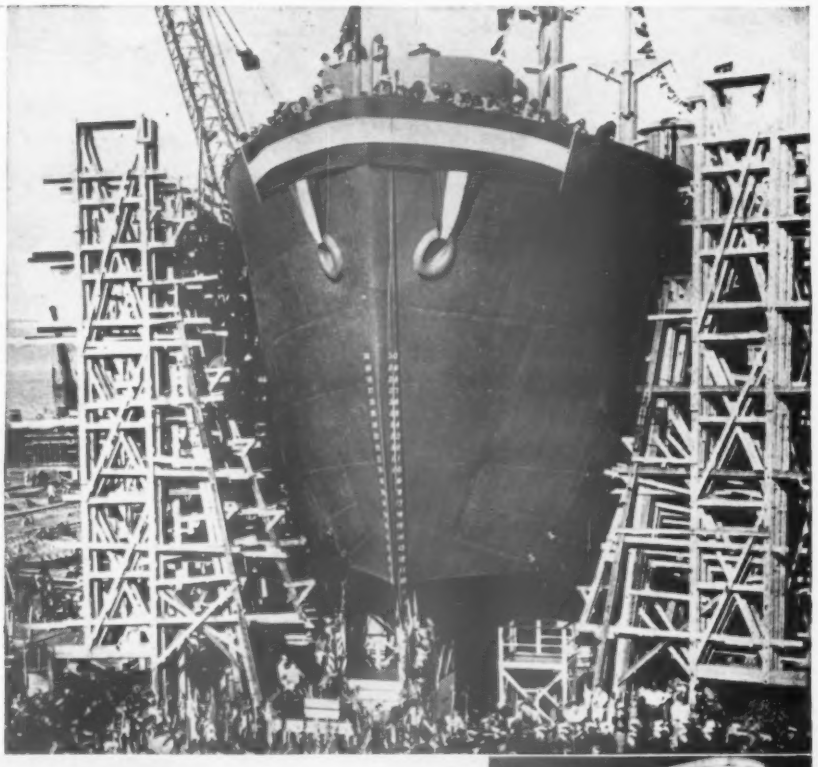
End-loading, end-unloading mill. Castings cleaned twice; before sorting and grinding; after sorting and grinding, ready for plating. Discharges onto inspection conveyor table. Power leader in pit.

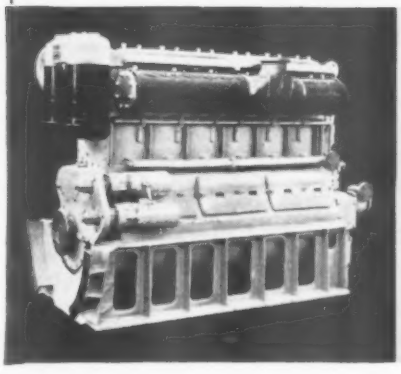
Side-loading, side-unloading wet mill cleaning brass pump castings. Cold water is pumped through mill. Tumbling material unusually brass crucible droppings.

## N. RANSOHOFF INC

TOWNSHIP AND BIG FOUR R. R. CINCINNATI, O.

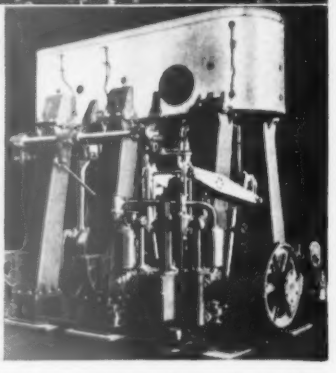
# Federated Bearing Alloys Are Used In Maritime Ships





## STEAM ⏵ OR ⏴ DIESEL

The principal bearing manufacturers for both types of marine engines are using Federated lead-base bearing alloys to replace tin-base alloys.



The reputation of Federated *tin base* alloys is well known. Have you considered the advantages of Federated's *new lead base* bearing alloys?

1. Properties comparable to tin base babbitts.
2. A method of application to either bronze, steel or cast iron backs, which prevents loose bearings.
3. An extra margin of conformability.
4. Easily lubricated.
5. Less likelihood of overheating.
6. Substantial savings in cost.
7. Readily available without priority.

*Consulting service available through your nearest Federated office.*

PRODUCTS PRODUCED BY FEDERATED METALS

| | |
|---|---|
| ALUMINUM | SOLDER |
| BRASS | BABBITT |
| BRONZE | TYPE METAL |
| DIE CAST ALLOYS | ZINC DUST |

All of these in all commercial forms — Special Alloys to your specifications.

FMD

*Federated*

METALS DIVISION

AMERICAN SMELTING and REFINING COMPANY

120 BROADWAY, NEW YORK (5) N. Y.

SALES OFFICES

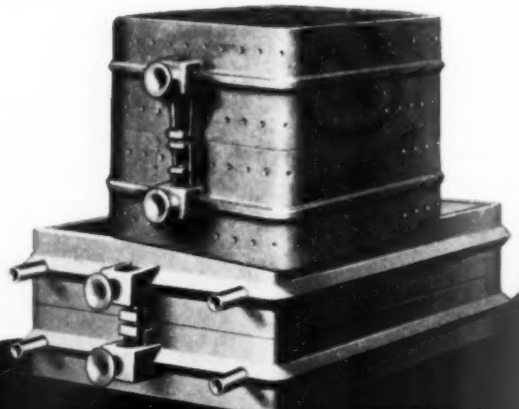
ATLANTA, GA.
BALTIMORE, MD.
BIRMINGHAM, ALA.
BOSTON, MASS.
CINCINNATI, OHIO
CLEVELAND, OHIO
DALLAS, TEXAS
DENVER, COLO.
DETROIT, MICH.
LOS ANGELES, CAL.
MILWAUKEE, WIS.
MINNEAPOLIS, MINN.
NEW ORLEANS, LA.
NEW YORK CITY
PHILADELPHIA, PA.
PITTSBURGH, PA.
PORTLAND, ORE.
ROCHESTER, N. Y.
SALT LAKE CITY, UTAH
ST. LOUIS, MO.
SAN FRANCISCO, CAL.
SEATTLE, WASH.
WHITING, IND. (Chicago)

PLANTS

BECKMEYER, ILL.
DETROIT, MICH.
HOUSTON, TEXAS
LOS ANGELES, CAL.
NEWARK, N. J.
PERTH AMBOY, N. J.
PITTSBURGH, PA.
SAN FRANCISCO, CAL.
ST. LOUIS, MO.
TRENTON, N. J.
WHITING, IND.

# *In the service of* UNCLE SAM!

Sterling, too, has enlisted in the service of our country. While the Armed Forces are busy on the fighting front, Sterling is actively engaged on the production front . . . 24 hours of the day . . . speeding vitally needed foundry flasks to War Production Foundries all over the nation.



Flasks available in various styles and shapes . . . all-welded, special rolled steel sections . . . strong but light, for speed and endurance.

## *Sterling* FOUNDRY FLASKS

STERLING WHEELBARROW COMPANY • MILWAUKEE, WIS., U. S. A.

A4171-1P

# MELTRITE PIG IRON

## Makes

## GOOD CASTINGS

SO RAPID have been the strides made by the foundry industry during the war that castings are now being used in countless new applications. Better equipment, materials, metallurgy, testing, personnel—each of these is contributing its vitally important share.

★ ★ ★

BUYING WAR BONDS
*Today*
HELPS PROVIDE JOBS
*Tomorrow*

**PICKANDS MATHER & COMPANY**

CLEVELAND · CHICAGO · DETROIT · ST. LOUIS · ERIE · DULUTH · MINNEAPOLIS · TOLEDO

New York City—William R. Alley · Philadelphia, Pa.—Carson, Marshall & Co.

San Francisco and Los Angeles, California; Seattle and Tacoma, Washington—H. L. E. Meyer Jr., & Co.

IRON ORE ★ PIG IRON ★ COAL ★ COKE

# Same Top Quality
# Same Light Weight

**PROMPT SHIPMENT ASSURED**

FREMONT FLASKS have always been renowned for efficiency and long wear. Their sturdy construction retains accuracy and as always, FREMONT FLASKS are light weight to speed production.

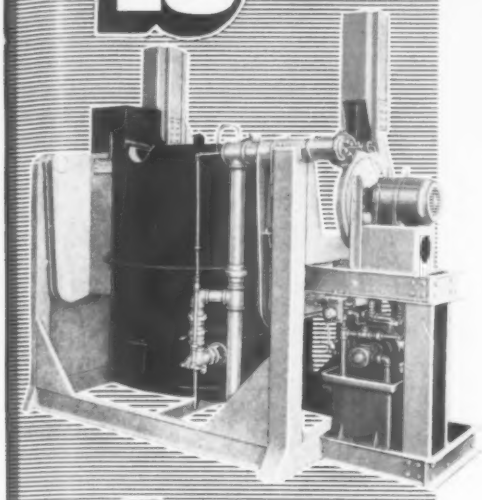
**THE FREMONT FLASK COMPANY**
**FREMONT, OHIO**

## Slip Flasks FREMONT GROOVLOCK Jackets

# STROMAN

## *The Last Word in Melting Furnaces*

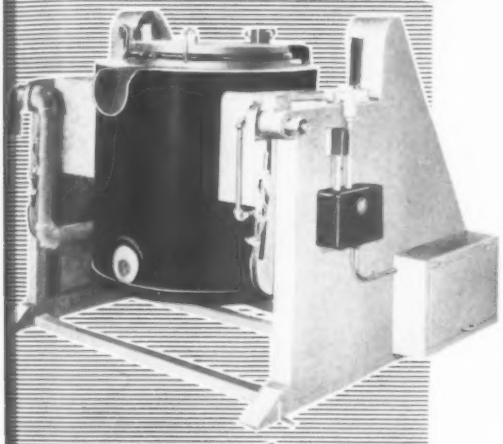
FOR BRASS, BRONZE, ALUMINUM, MAGNESIUM AND ALL OTHER NON-FERROUS METALS



### HYDRAULIC TILTING FURNACES

**FOR ALUMINUM AND MAGNESIUM**
**Capacities: Aluminum 500 to 3000 lbs. — Magnesium 350 to 2000 lbs.**

These furnaces combine every known furnace innovation, to assure fastest, safest and most economical production. Hydraulic Tilt is the safest, smoothest, easiest to operate and greatest metal saving manner of pouring . . . Stationary Lip Pour, another feature, allows ladle to remain in the same position during entire pour . . . Variable Speed Pour controls tilting speed as desired by operator . . . Streamline Design conserves floor space . . . Heavy Duty Construction assures longest life. They can be fired by either oil or gas.



### CRUCIBLE FURNACES . . . MECHANICAL TILTING

**FOR BRASS AND ALUMINUM**
**Capacities: 450 to 1200 lbs. — Aluminum 150 to 400 lbs.**

The most advanced furnace of its type. Stationary Lip Pour holds metal spillage to a minimum and speeds production . . . Electric Tilt is finger-tip controlled . . . New Push-Back Cover is easiest and safest to operate . . . Oil or gas fired in conjunction with Stroman Blowers they are most economical in fuel costs . . . Safety features are many and exclusive with Stroman Furnaces.

### MANUAL TILTING FURNACES

**FOR BRASS, BRONZE AND ALUMINUM**
**Capacities: from No. 40 to 400 Crucible**

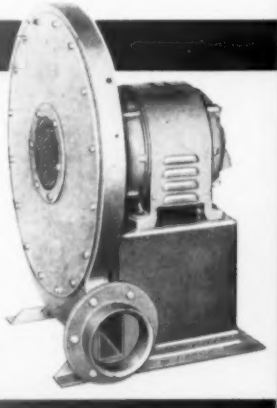
The "Old Standby's" with the rugged construction that has proved that these furnaces can "take it" in many of the leading foundries the country over. Redesigned to eliminate old style massiveness without sacrificing strength or rigidity anywhere, this is a more popular furnace than ever. Tilt mechanism is hand wheel, easy to operate, swing cover is extremely easy to open and close. Oil or gas fired as desired. All sizes from 40 to 400 CRUCIBLES.

### CRUCIBLE STATIONARY FURNACES

**FOR BRASS, BRONZE, ALUMINUM AND OTHER NON-FERROUS METALS**
**Capacities: from No. 20 to 400 Crucible**

Sturdy, efficient, time saving, these Stroman Furnaces are also most economical in their daily production. Choice is given of three types of covers. The Push-Back which is an exclusive Stroman development and is a great time and labor saving feature . . . is most popular. They are also available with Swing type or Counter-Balanced covers. Oil or Gas fire.

### STROMAN CENTRIFUGAL BLOWERS



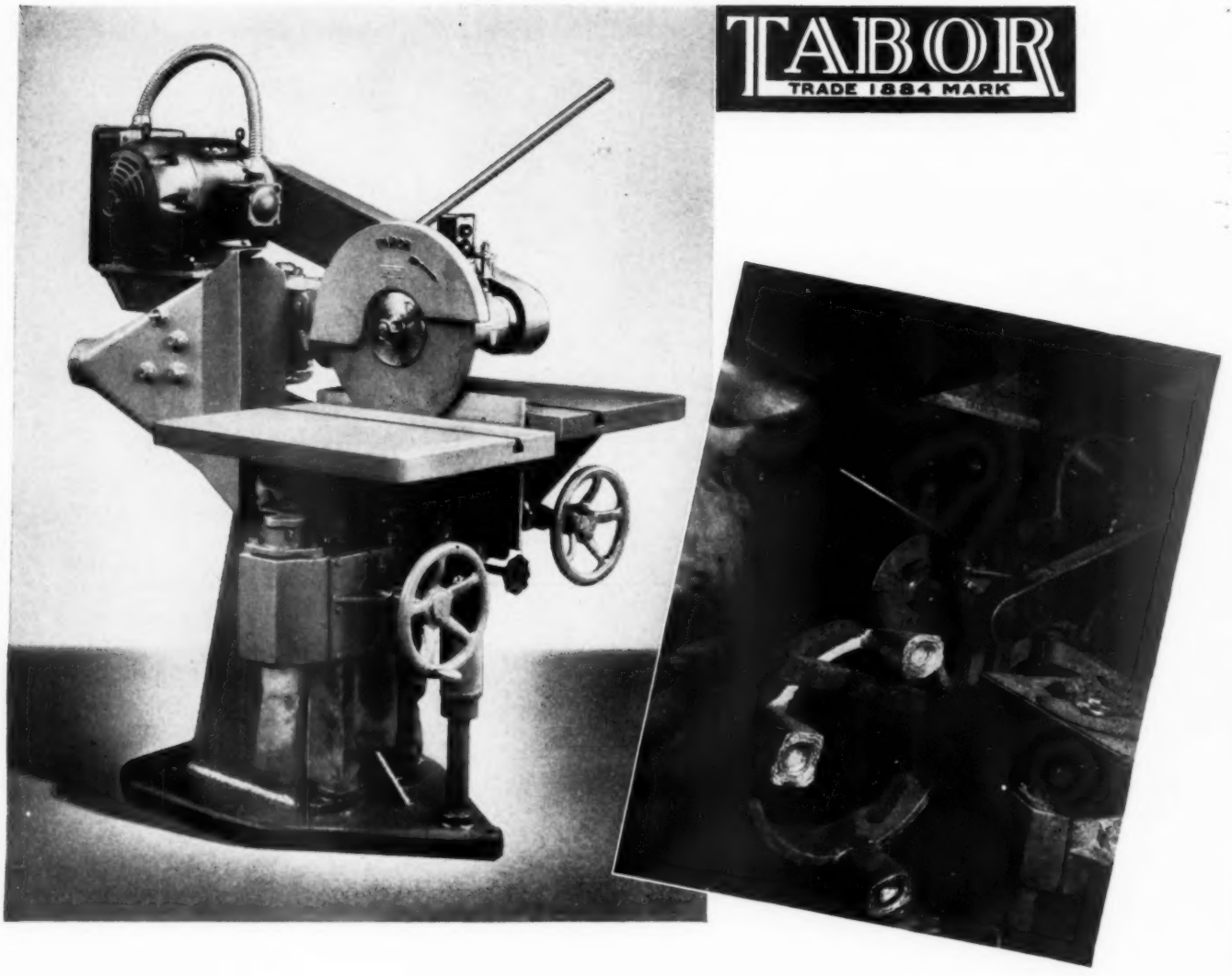
Combine every feature to make a great blower . . . Uniform Pressure . . . Simplicity of Design . . . Welded Steel Fabrication . . . Permanent Alignment . . . Quiet Operation . . . Compactness. All in all they have many uses in the foundry field and assure you of getting the correct amount of air where you want it when you want it.

WRITE NOW FOR FULL INFORMATION OF FURNACES AND BLOWERS

## STROMAN FURNACE & ENGINEERING CO.

DIVISION OF

THE PETERSEN OVEN CO. 300 W. ADAMS ST. CHICAGO



TABOR
TRADE 1884 MARK

# TABOR-BRASIVE CUT-OFF MACHINES

## *Users say . . .*

". . . We highly recommend the Cut-Off Machine which we purchased from you a few months ago. It is a real saving in time, money and labor. Before we purchased this machine, we used saws and this process was long. The machine saves us both time and labor as it cuts the castings much quicker and better. We have also eliminated the heavy expense of the band saws and we find that the expense connected with the machine is far less than the amount of the saws used . . . "

## *And*

". . . advising you again how pleased we are with the machine. It has been running steadily since we received it in June (two months) without a single break-down of any sort, and it has made hundreds of cuts during this time.

. . . Assuring you that at any future time we may be in need of machines of this nature, we will certainly contact you first, we are, etc."

Tabor-Brasive Cut-Off Machines save time, money and labor in cutting gates and risers from castings of manganese bronze, nickel, Monel and other non-ferrous alloys, as well as alloy steel. Built in a complete line of sizes and types to meet any cutting need.

**THE TABOR MANUFACTURING COMPANY**
**6225 Tacony Street • Philadelphia • Pennsylvania**

**Representatives:** Snyder Foundry Supply Co., *Los Angeles, Calif.;* Pacific Graphite Works, *Oakland, Calif.;* Carl F. Miller & Co., *Seattle, Wash.*

# 50

## YEARS OF KNOW-HOW

For over 50 Years this Organization has been one of America's Main Sources for Non-Ferrous Alloy Ingot from Scrap Metals

BUY
WAR
BONDS

## MICHIGAN SMELTING AND REFINING

Division of BOHN ALUMINUM & BRASS CORPORATION, Detroit, Michigan

*General Offices - Lafayette Building*

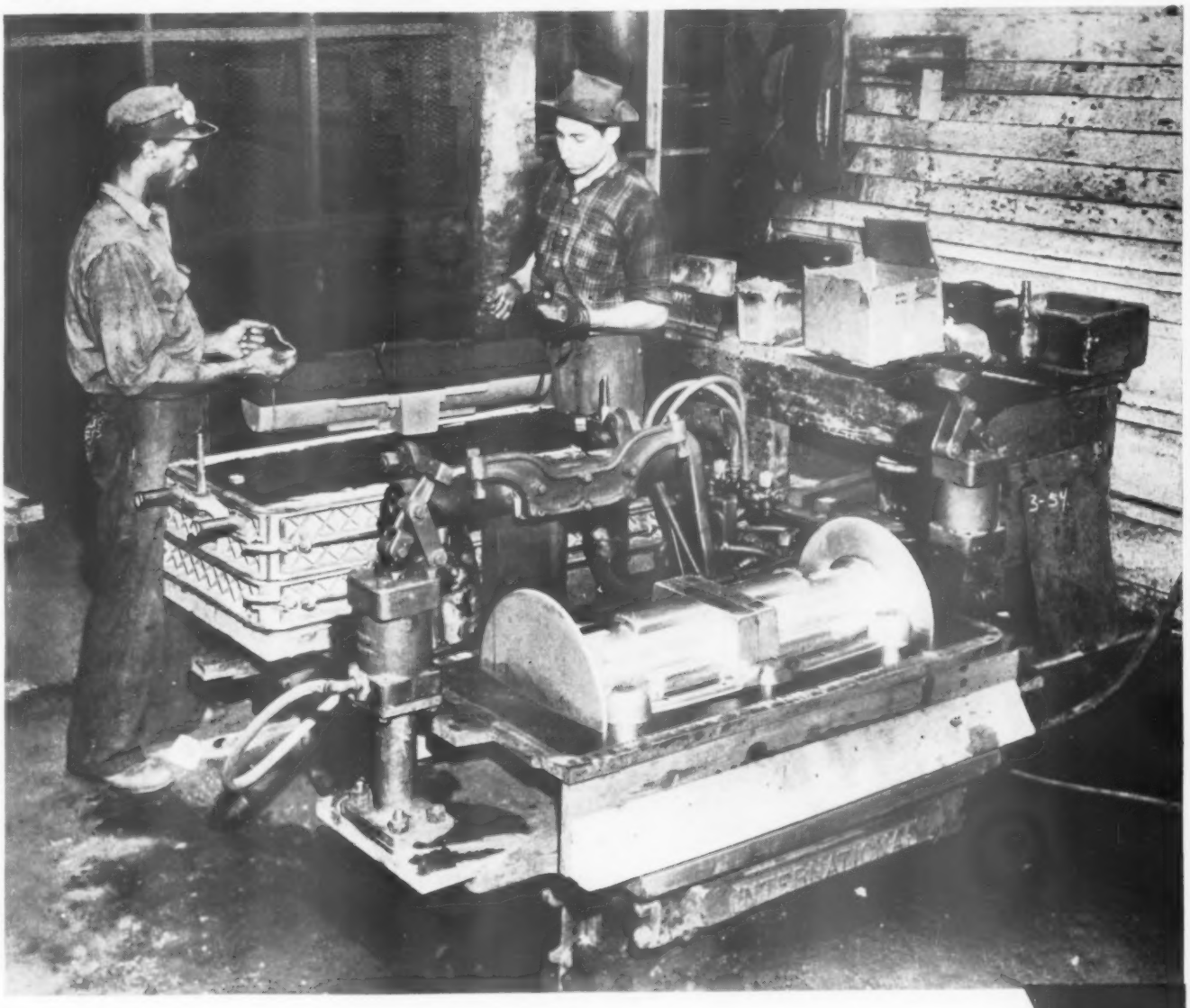
# AGAIN and AGAIN and AGAIN

*Hines Flasks*

**Why? Because they are made**

**HINES FLASK**

# in FOUNDRIES EVERYWHERE



*and Jackets*

**to meet all Foundry Conditions.**

C O • 1324 HIRD AVENUE • CLEVELAND • OHIO

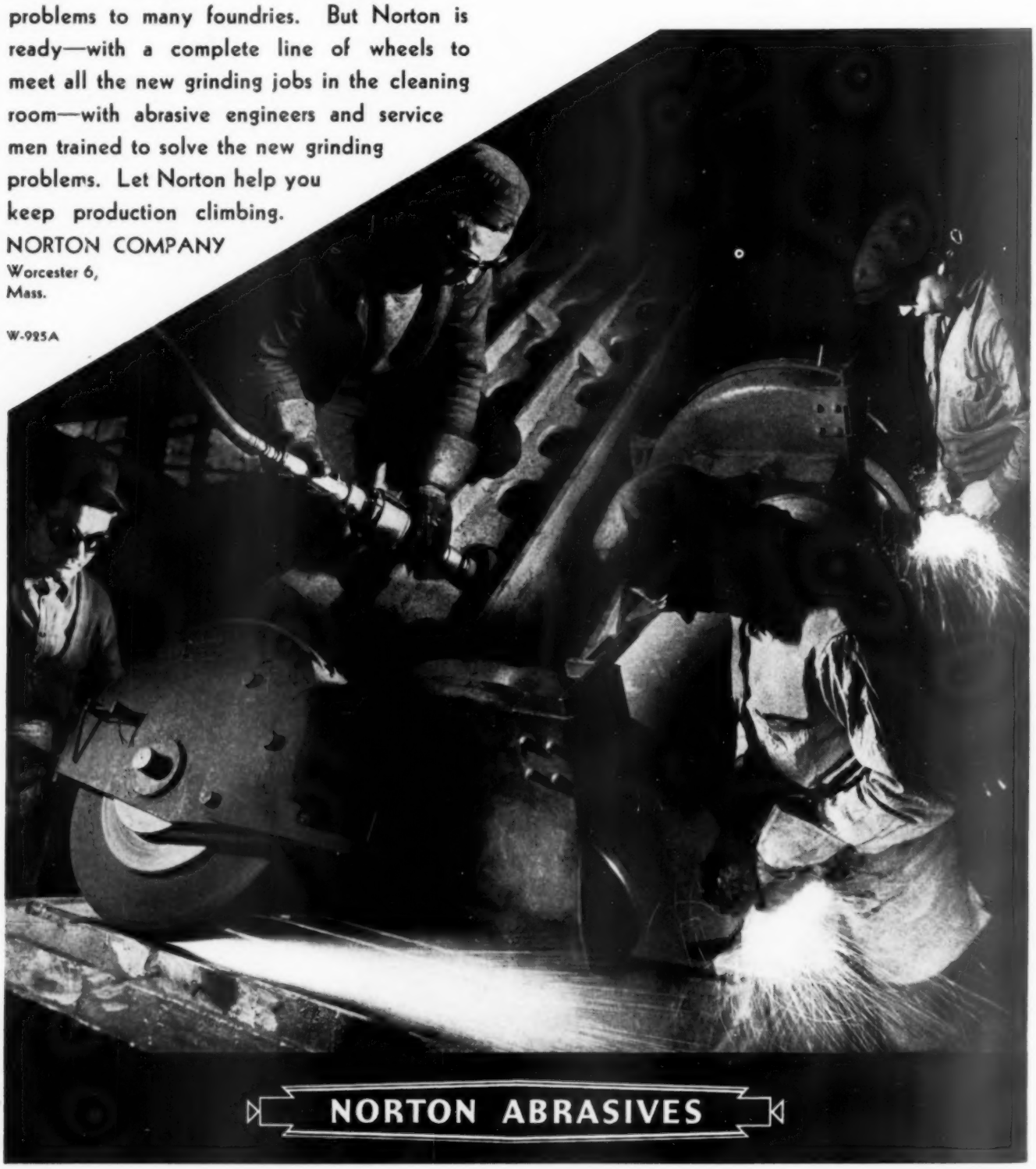
# You Can Boost Production

*...with the Right Grinding Wheel on Each Job in the Cleaning Room*

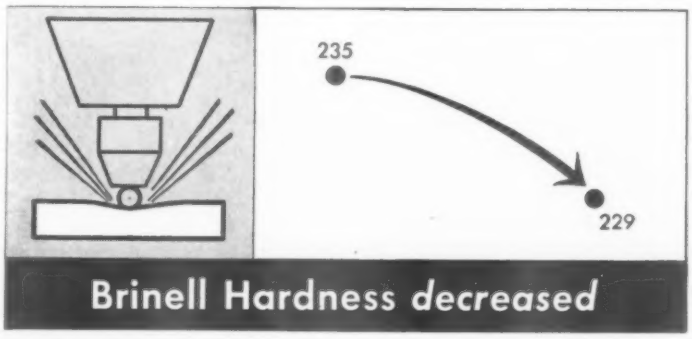
PRODUCTION curves must go up. War work is bringing new jobs—new grinding problems to many foundries. But Norton is ready—with a complete line of wheels to meet all the new grinding jobs in the cleaning room—with abrasive engineers and service men trained to solve the new grinding problems. Let Norton help you keep production climbing.

NORTON COMPANY
Worcester 6, Mass.

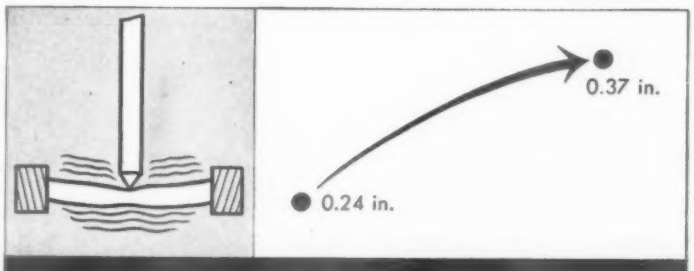
W-925A



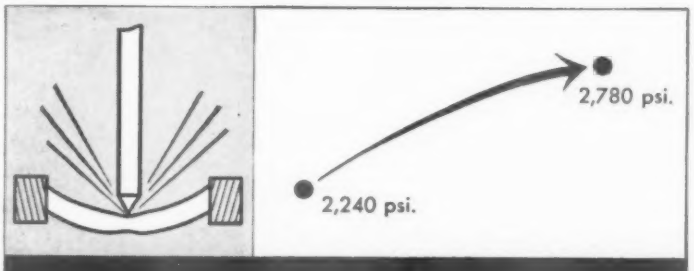
# Notice How SMZ Alloy Ladle Additions *improve this Iron*



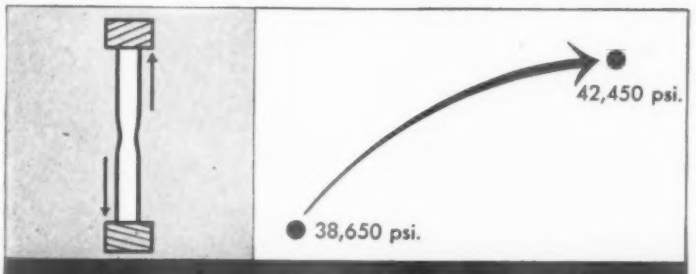

**Brinell Hardness *decreased***




**Transverse Deflection *increased***




**Transverse Strength *increased***




**Tensile Strength *increased***

These are typical results obtained from a series of commercial tests on high-strength cast iron at a large job foundry. Both the treated and untreated iron contained 3.20 per cent total carbon, 0.95 per cent manganese and 1.75 per cent silicon. In the treated iron 0.35 per cent of the silicon was added in the ladle as SMZ Alloy ... a special balanced alloy containing silicon, manganese, and zirconium.

These improved physical properties are consistently obtained because of the excellent solubility of the alloy.

Furthermore, irons treated with SMZ Alloy have better machinability than untreated irons of the same hardness.

The use of ladle additions of SMZ Alloy permits this foundry to make castings over a wide range of thicknesses using but two inoculated irons, and eliminates the necessity for making special iron for very heavy castings.

This foundryman's experience is typical of the results being obtained with SMZ Alloy. For further information write for the booklet, "SMZ Alloy and Its Uses as a Ladle Addition in Cast Iron."

**Electromet**
Trade-Mark
**Ferro-Alloys & Metals**

***BUY UNITED STATES WAR BONDS AND STAMPS***

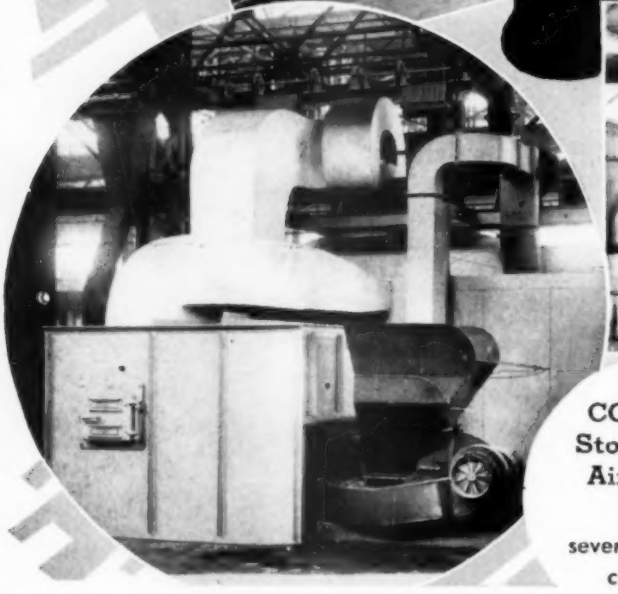
"SMZ" is a registered trade-mark of Electro Metallurgical Company

ELECTRO METALLURGICAL COMPANY
*Unit of Union Carbide and Carbon Corporation*
30 East 42nd Street UCC New York, N. Y.
In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario

# Act Now--
# TO MEET FUEL PROBLEM

COLEMAN
Transrack
Core Ovens
with
stoker-fired
recirculating
air heating
system.

*Perfect Baking with*
**COLEMAN COAL-FIRED**
*Heating Systems*



COLEMAN
Stoker-Fired
Air Heater
built in
several sizes and
capacities.

COLEMAN
Car Type Core Ovens
with stoker-fired external recirculating
air heating system.

**COLEMAN**
**CORE AND MOLD OVENS**

***THE FOUNDRY EQ***
BUILDERS OF COLEMAN ND
***CLEVELAND, OHI***

**Coleman "Know-How" is proved by 8,000 Successful Installations and 40 Years' Experience!**

# ...and CUT BAKING COST!

If a shortage of fuel oil or gas in your locality threatens your production schedule, investigate Coleman Coal-Fired Core and Mold Ovens at once.

So highly perfected are the Coleman Coal-Fired Recirculating Air Heating Systems, that you get results equal to that of good oil or gas fired systems. CLEAN HEAT, FAST AND PERFECT BAKING AND LOW COST OPERATION ARE POSITIVELY GUARANTEED!

Coleman Coal-Fired Ovens of all types—Rolling Drawer, Transrack, Car and Conveyor, are giving enthusiastic satisfaction in leading foundries using either bituminous or anthracite coal.

Furthermore, Coleman Stoker-Fired Systems permit easy conversion to oil or gas in post-war production, if desired.

***Time is short!***

*Write or wire for a Coleman Oven Engineer today. He'll gladly present full details, personally.*

COLEMAN Rolling Drawer Core Ovens for speedy baking of small and medium cores.

COLEMAN Tower Ovens for high speed production. Amazing savings in floor space and production costs.

COLEMAN Horizontal Core Ovens for large scale specialized core production.

- There is a right type and size of Coleman Oven to best suit your requirements. Built for whatever fuel is most easily and economically obtainable in your district.

**COLEMAN Portable Ovens**
**COLEMAN Rolling Drawer Ovens**
**COLEMAN Transrack Ovens**
**COLEMAN Car Type Ovens**
**COLEMAN Tower Ovens**
**COLEMAN Horiz. Conv. Ovens**

*Write for Folio of Bulletins*

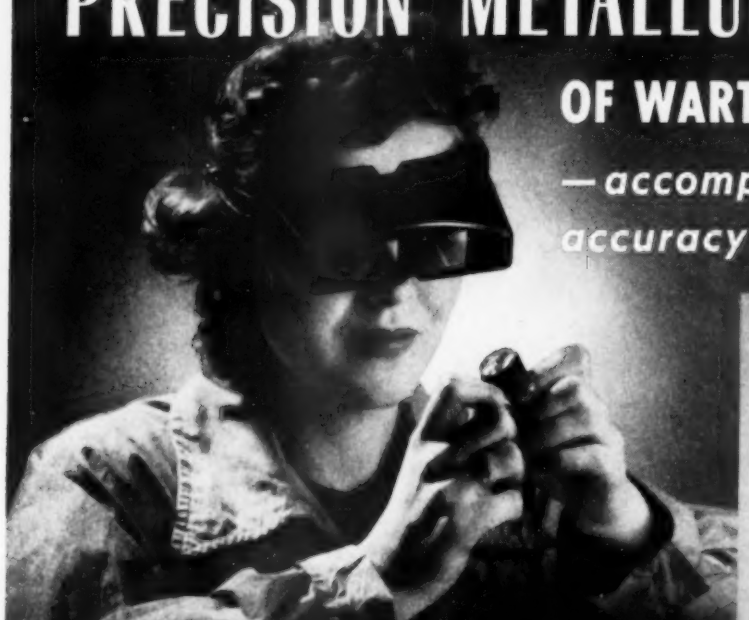
**...Y EQUIPMENT CO.**
**...AN ...ND SWARTWOUT OVENS**
**...ND, OHIO, U.S.A.**

**COLEMAN CORE AND MOLD OVENS**

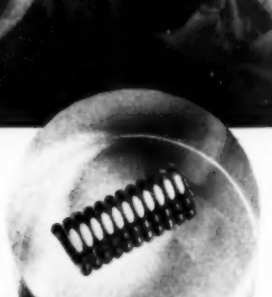
# PRECISION METALLURGICAL TESTING

## OF WARTIME SUBSTITUTE ALLOYS

*—accomplished with speed and accuracy with Buehler equipment*



Every piece of metallurgical testing equipment manufactured by Adolph Buehler is distinguished for its mechanical precision. This is but a reflection of Mr. Buehler's long experience in the field of optical instruments, where precision and accuracy achieve their highest expression. The functional design of Buehler equipment is a development of daily personal contacts with metallurgists and their problems.

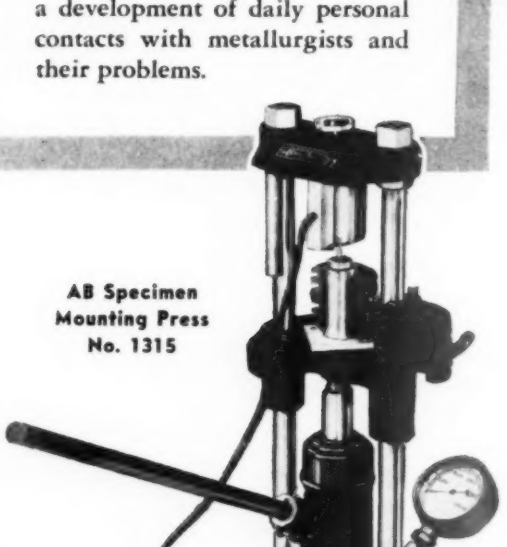


**EYE SHADE MAGNIFIER** — for convenience and speed in the laboratory. Large, clear field. Quick change to normal vision by simply pushing up on forehead.

**SPECIMEN MOUNTS** — both bakelite and transoptic are molded with ease and speed in the new AB press.

## NEW SPECIMEN MOUNT PRESS

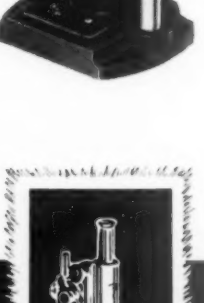
Designed to provide the utmost in ease and speed of making transoptic mounts. Constructed with a rugged simplicity that will give long service and precision built for accuracy. The molding tools are lapped finished for close tolerance with a perfect fit. Either 1" or 1¼" molds may be used with ease on the AB presses. The new design retains the solid heater which brings the mold to top temperature faster; however, on the new model, it is not necessary to release the pressure before cooling the sample. This is accomplished by sliding the heater up the mold onto a holder pin and swinging a pair of finned cooling blocks into position, where they are held by a locking lever. The heater and cooling blocks need not be removed from the press. This keeps them out of the way and prevents accidental burns.



**AB Specimen Mounting Press No. 1315**

**A complete line of equipment for the Metallurgical Laboratory**

SPECIMEN MOUNT PRESSES • POLISHERS • POLISHING ABRASIVES • POLISHING CLOTHS • POWER GRINDERS • BELT SURFACERS • CUT-OFF MACHINES • HAND GRINDERS • CARBON METERS COLORIMETERS • HARDNESS TESTERS • DUST COUNTERS • DILATOMETERS • EMERY PAPER GRINDERS • LABORATORY CHAIRS • TITRATORS • MAGNIFIERS • METALLOGRAPHS • MICROSCOPES • STEREOSCOPES • PYROMETERS • REFRACTOMETERS • SPECTROGRAPHS • MACRO CAMERAS



Adolph I. Buehler

OPTICAL INSTRUMENTS ★ METALLURGICAL APPARATUS

228 North LaSalle Street, Chicago 1, Illinois

# *Single Flask Fillers*

## in pairs for making drags and copes

● Bartlett-Snow Flask Fillers are available in a wide variety of types and sizes, including swinging chute flask fillers,—pivoted boom flask fillers,—stationary bin and apron feeder flask fillers (illustrated above), and various special types to meet unusual conditions.

The stationary bin and apron feeder flask fillers, most popular of the several types, are adapted readily to the floor space, head room, flask size, and other conditions of the individual installation. The bins vary in size from 5 to 20 ton capacity, and the apron feeders, at point of discharge, are fitted with deflecting plates or chutes, to spread the sand to distant corners of large flasks.

Our recently issued 40-page Bulletin No. 91, which illustrates many different types of flask fillers,—and other Bartlett-Snow Foundry Equipment,—will be of great interest to every foundryman. Send for a copy!

**THE C. O. BARTLETT & SNOW CO.**

**6201 HARVARD AVE. • CLEVELAND, OHIO**

***Engineering and Sales Representatives in the Principal Cities***

**FOUNDRY SAND, MOLD AND CASTINGS HANDLING • • DUST AND FUME CONTROL SYSTEMS • •**

Hydro-Blasting marine engine casting at Joshua Hendy Iron Works

# The Iron Men of Hendy

## Clean Castings Faster and Cleaner and Recover Valuable Sand with The Hydro-Blast System

This largest producer of marine engines in the United States says: "Two valuable contributions are also made by the Hydro-Blast system beyond the cleaning of castings. The tremendous water velocity creates an air current which becomes a form of air conditioning for the plant, drawing the dust-laden warm air into the Hydro-Blast working area where the Hydro-Blast wets down dust particles and disperses cool air throughout the cleaning room. Secondly, the Hydro-Blast is reclaiming, washing and classifying 75 percent of the used core sand."

Hydro-Blast employs wet sand and water to knock out cores, surface clean castings to microscopic cleanliness and remove imbedded sand particles, so that chipping, grinding and machining costs are greatly reduced. Two unskilled laborers and Hydro-Blast can do the work of ten sand chippers, and do it far better, while releasing eight men for other highly essential work.

Hydro-Blast also makes a direct contribution toward more healthful working conditions. In every foundry where "before and after" dust counts have been made, it has been found that the atmosphere in the Hydro-Blast room, as well as the surrounding atmosphere, is cooled and cleansed to a marked degree.

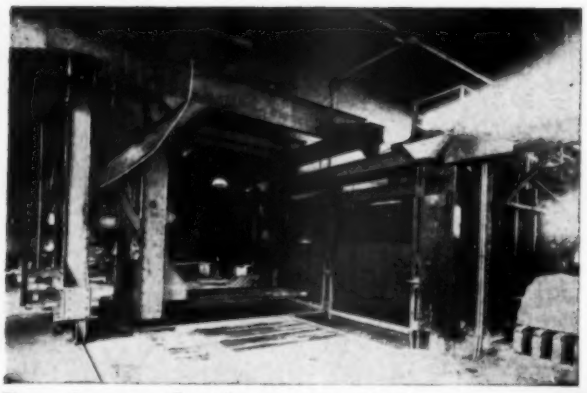
Today, more than fifty Hydro-Blast systems are working for such other outstanding foundries as Ford Motor, Symington Gould, Worthington Pump, American Maganese Steel, and a host of others.

**Foundry executives and engineers who are not familiar with Hydro-Blast's efficient, economic and hygienic advantages will be given free information on request.**

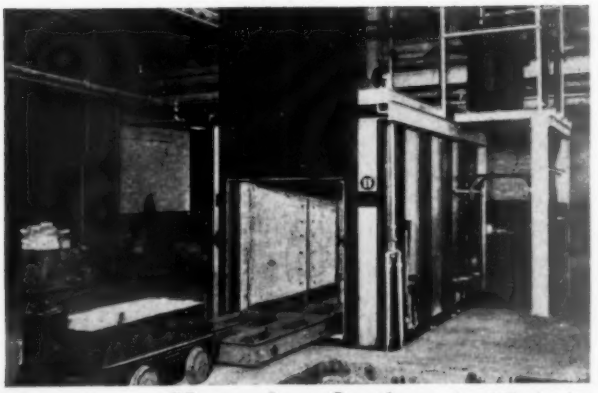
**The**
**HYDRO-BLAST**
**CORPORATION**

2550 N. WESTERN AVENUE
CHICAGO 47, ILLINOIS

Hydro-Blast room at Joshua Hendy showing sand recovery system



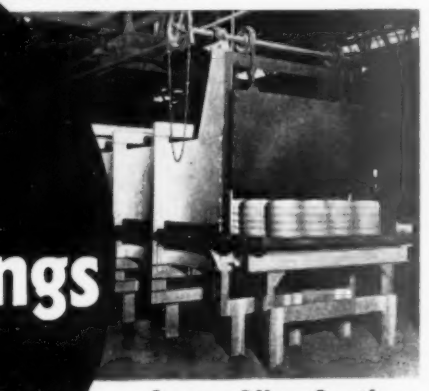
**For Large Castings** Heavy Tank Castings and and quenched in EF furnaces similar to other large parts and products are heated the above.



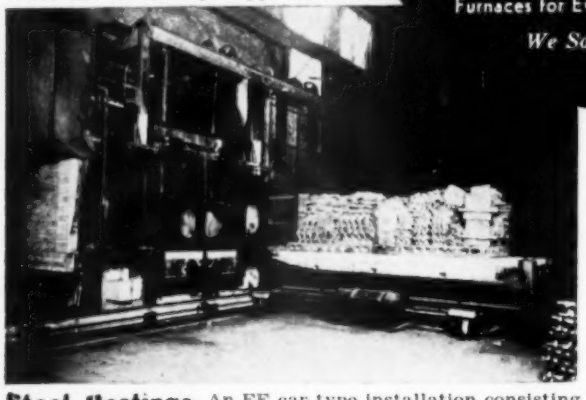
**Magnesium Castings** An EF single-ended electric car type furnace with baffles and forced circulation for uniformly heat treating magnesium castings.

A Few
Electric and Fuel Fired
Continuous and Batch Type
FURNACES
FOR
# Annealing Castings
Designed and Built by
## The Electric Furnace Co.
Salem, Ohio
Furnaces for Every Industrial Heating Process
*We Solicit Your Inquiries*

**Aluminum Castings**
The accurate temperature control and uniform heat distribution necessary for aluminum is provided by these EF circular pit type furnaces.



**Large Alloy Castings**
Discharge end of an EF continuous oil fired roller hearth type furnace annealing special alloy castings—continuously.



**Steel Castings** An EF car type installation consisting of two heating chambers, a cooling chamber, car puller and cross transfer car, for annealing large steel castings.

**Annealing and Nitriding** Miscellaneous castings are uniformly annealed in these EF fuel fired car type furnaces—also used for nitriding.

**Scale Free Annealing** 40,000 lbs. of malleable castings per day are annealed absolutely scale free in these EF special atmosphere continuous pusher type short cycle annealing furnaces.

**Gray Iron Castings** An EF return recuperative type furnace annealing miscellaneous gray iron castings—continuously—the heat from the outgoing castings preheats the incoming material—saves fuel.

## HE MAY BE MILES AWAY—YET HE'S *Always at Your Elbow*

● That's one of the advantages of Republic's metallurgical service to foundries. The Republic Pig Iron Metallurgist will spend all the time necessary when he visits your foundry to help you obtain greatest output efficiency from your equipment. He will stay on the job until difficulties in production are corrected.

And even after he goes on his way—to another city or state—he will continue to be "always at your elbow"—in the form of the valuable advice and suggestions that he has left with you. Should an emergency arise, he will do his best to be at your elbow in person whenever you need him.

Now is the time to get acquainted with this man. You'll find his technical knowledge and practical foundry experience both helpful and profitable. And there is no cost or obligation. Just tell us when you'd like him to call.

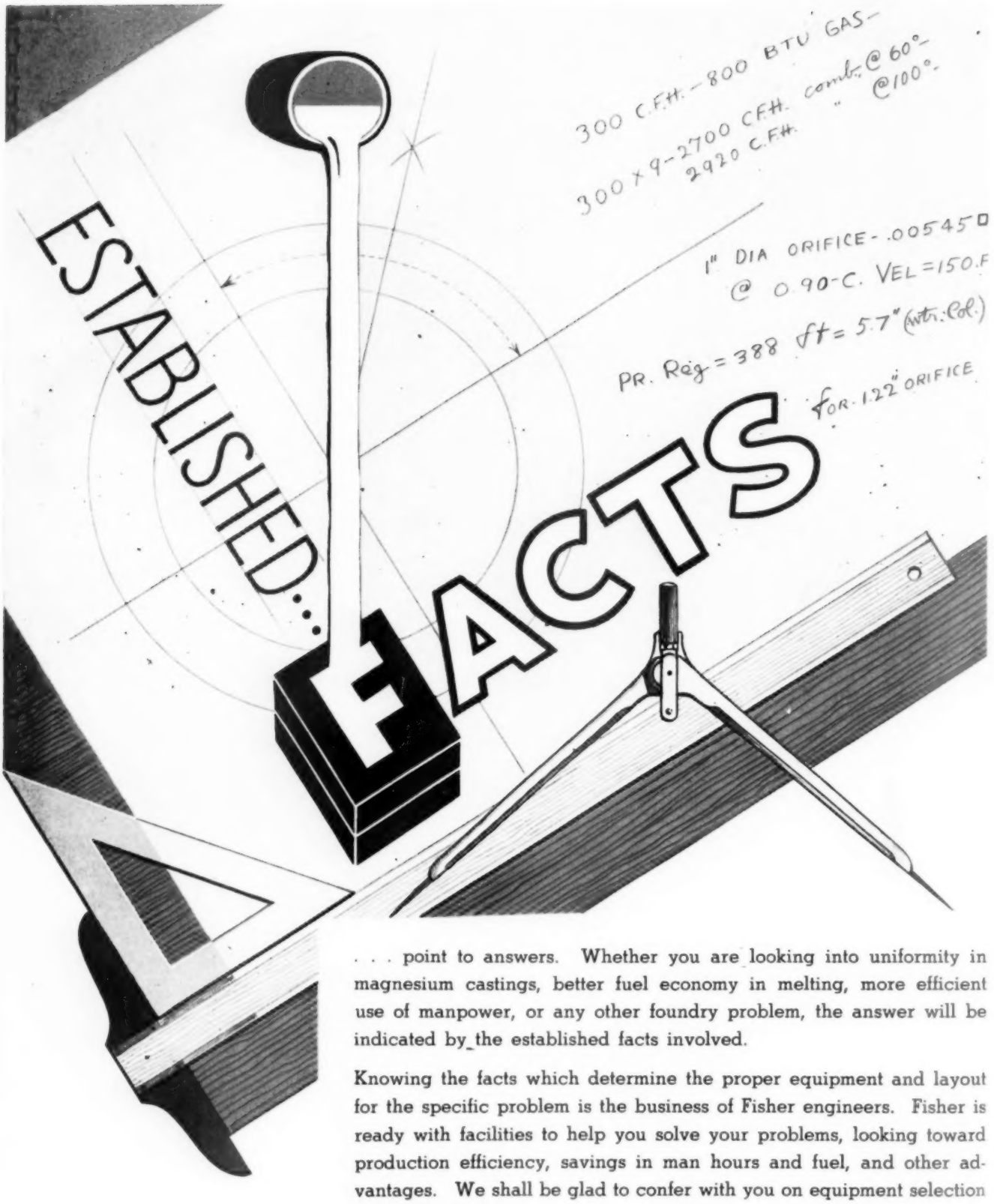
**REPUBLIC STEEL CORPORATION**
**General Offices: Cleveland 1, Ohio**
Berger Manufacturing Division • Culvert Division
Niles Steel Products Division • Steel and Tubes Division
Union Drawn Steel Division • Truscon Steel Company
Export Department: Chrysler Building, New York, New York

*Republic*

# PIG IRON

**"CHATEAUGAY"**
*Low-Phosphorus, Copper-Free*
**"REPUBLIC"**
(Northern)
*Foundry, Basic and Malleable*
**"PIONEER"**
(Southern)
*Foundry and Basic*

**ALSO TRUSCON FOUNDRY FLASKS • REPUBLIC CORE WIRE • FOUNDRY NAILS**


ESTABLISHED...FACTS
300 C.F.H. - 800 BTU GAS
300 x 9 - 2700 C.F.H. comb. @ 60°
2920 C.F.H. " @ 100°
1" DIA ORIFICE - .00545 □
@ 0.90-C. VEL = 150.F
PR. Req = 388 ft = 5.7" (Wtr. Col.)
FOR 1.22" ORIFICE

. . . point to answers. Whether you are looking into uniformity in magnesium castings, better fuel economy in melting, more efficient use of manpower, or any other foundry problem, the answer will be indicated by the established facts involved.

Knowing the facts which determine the proper equipment and layout for the specific problem is the business of Fisher engineers. Fisher is ready with facilities to help you solve your problems, looking toward production efficiency, savings in man hours and fuel, and other advantages. We shall be glad to confer with you on equipment selection and utilization.

ESTABLISHED FACT NUMBER ONE is that proper furnaces and blowers are a basic step toward foundry improvement.

● *Find out the facts on Fisher equipment. Write for complete information.*

**5519 N. WOLCOTT AVE., CHICAGO, ILLINOIS**

**Fisher FURNACE COMPANY**

# BIG PUSH CALLS FOR STEEL

# Scrap faster . . .

# Win sooner!

With Axis morale sinking faster under every bombing . . . with American boys already helping to crack the fortress of Europe ahead of schedule . . . we're setting up the Axis for the final hay-maker!

That means an advance behind a curtain of shrieking steel . . . continuous barrages blasting our enemies round-the-clock until they say Uncle!

### THE TIME IS NOW

So our war planners have flashed an urgent message to *keep the steel coming*. And remember, half of the huge production will be scrap. Will we make it? Of course we will!

We'll make it because every pound of that steel scrap now so urgently needed will help to shorten the war by just that many days, hours and minutes!

We'll make it because that means saving the lives of so many dear to us.

We'll make it because 300,000 tons of steel in the next quarter will go into farm implements . . . to till and tend those extra acres that will feed our fighters . . . and the home front too.

### BE WISE — ORGANIZE!

So *organize* your scrap drive . . . make it a continuous operation . . . in charge of a square-jawed executive with authority to keep it rolling!

And segregate your steel types, wherever possible, according to alloys and grades. It will save time all along the line . . . get your steel into the fight faster!

No matter how many times you have looked . . . look again . . . and *keep right on looking!* For only then will the furnaces be able to push capacity to the limit . . . Only then will the tanks, planes, ships and guns be ready for the ferocious onslaught that can and must spell the utter destruction of Axis tyranny!

### WHAT IS DORMANT SCRAP?

**Obsolete machinery, tools, equipment, dies, jigs, fixtures, etc., which are incapable of current or immediate future use in the war production effort because they are broken, worn out, irreparable, dismantled or in need of unavailable parts necessary to practical re-employment.**

●

### FOLLOW THIS RULE

**If it hasn't been used for three months, and if someone can't prove that it's going to be used in the next three—sell it*—or scrap it.**

***Scrap and used equipment dealers pay well for usable machinery and materials.**

## BUSINESS PRESS INDUSTRIAL SCRAP COMMITTEE

ROOM 1310, 50 ROCKEFELLER PLAZA, N. Y. C.

**If you have done a successful salvage job at your plant, send details and pictures to this magazine.**

**SEND FOR PRIMER OF INDUSTRIAL SCRAP TO HELP YOU TACKLE THE SALVAGE PROBLEM**

**BUSINESS PRESS INDUSTRIAL SCRAP COMMITTEE**
**ROOM 1310, 50 ROCKEFELLER PLAZA, N. Y. C.**
**Please send a "Primer of Industrial Scrap" to**

**Your name** _____

**Company name** _____

**Company address** _____

**BAKING TIME CUT 65%**

**1 MAEHLER OVEN REPLACES 5 OLD OVENS**

**2½ HRS. INSTEAD OF ALL DAY**

**2 OVENS TO DO WORK OF SIX**

## Better, faster, cheaper baking of all size cores

● Have you a "bottleneck" in your core baking department? It's worth looking into, to see how Maehler recirculating airheat core and mold ovens have been solving such problems.

Here's a typical example, on small cores Maehler 2 compartment rack type oven replaced 6 brick drawer type ovens, with these results: much shorter baking time . . . less handling of cores . . . less space required for ovens . . . less heat and core gas in core room . . . uniform baking, top to bottom trays . . . core loss cut to zero . . . accurate temperature control in each compartment . . . and a safer place to work.

These days the foundry that doesn't have the most efficient core room equipment is at a disadvantage. Possibly we can solve *your* problem on the baking of large and small cores and molds. Write for information.

# MAEHLER

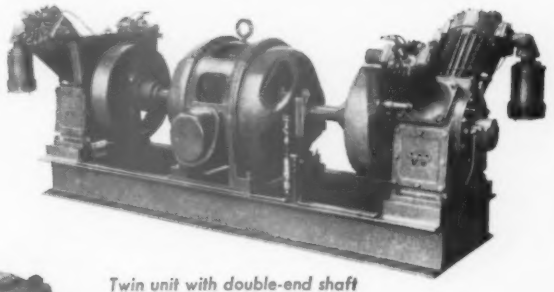
**Industrial Ovens and Furnaces**

**THE PAUL MAEHLER CO.**

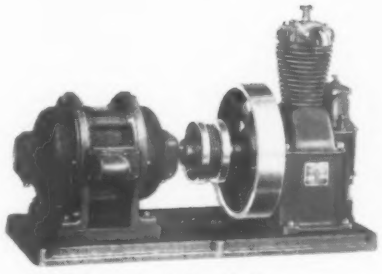
**2200 W. LAKE STREET • CHICAGO 12, ILLINOIS**

*Above: Maehler 2-compartment oven that replaced 6 brick core ovens. Left: Maehler core oven with separate compartment for small cores.*

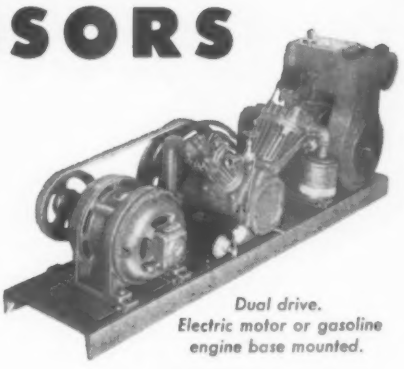
# WORTHINGTON Vertical COMPRESSORS



Twin unit with double-end shaft motor on steel base



Unit direct connected to electric motor



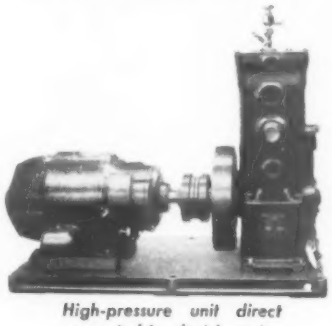
Dual drive. Electric motor or gasoline engine base mounted.

**24 Sizes**

**344 Arrangements**

**Capacities to 164 c.f.m.**

**Pressures to 1000 lbs.**



High-pressure unit direct connected to electric motor

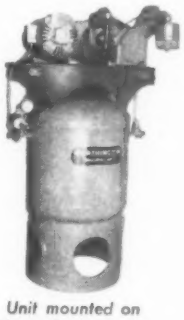
**War production plants are now using these units in a total of more than two million horsepower. To any plant whose needs for compressed air fall within the above range, Worthington compressor equipment offers advantages that can contribute greatly to stepped-up output They are built for users who demand the best equipment.**

## The following features make Worthington compressors the choice of careful purchasers.

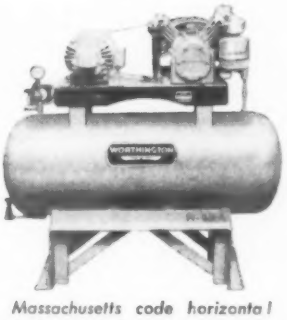
- One-piece Feather Valve . . . lightest, simplest, most efficient.
- Close-grained nickel iron cylinder, honed to mirror surface . . . generously finned for efficient cooling.
- Ground piston, closely fitted in cylinder . . . two compression rings and two oil rings . . . for oil-free air discharge.
- Full-floating wristpin . . . retainer spring prevents scored cylinder.
- Extra-long drop-forged heat-treated connecting rod . . . reduces cylinder wear. Shim-adjusted babbitt crankpin bearing. Graphite-bronze wristpin bushing.
- Drop-forged heat-treated integrally-counterbalanced crankshaft . . . journals ground and polished.
- Adjustable Timken main bearings . . . controlled splash lubrication.
- Force-feed lubrication to all shaft bearings . . . adjustable babbitt main bearings.
- Shaft oil-seal keeps compressor installation clean and oil-free.
- Crankcase ventilator . . . well baffled . . . keeps oil in, and dust out.
- Cast-iron belt wheel with fan spokes . . . good cooling decreases power required.

Tank-mounted belted unit showing pressure regulator control

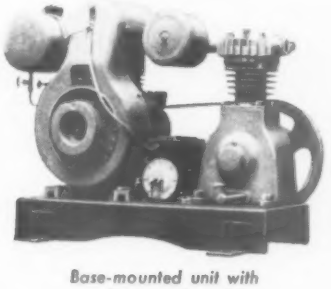
Worthington vertical compressors are available to those manufacturers whose war production activities give them priority. An authorized Worthington industrial dealer or district office engineer will be glad to assist you with the correct selection for your requirements.



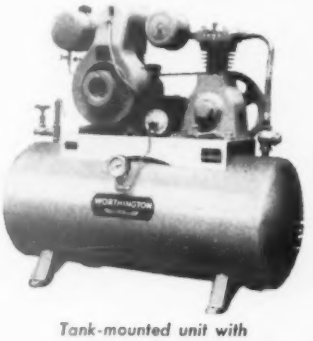
Unit mounted on Massachusetts code vertical tank



Massachusetts code horizontal tank-mounted compressor unit



Base-mounted unit with gasoline engine drive



Tank-mounted unit with gasoline engine drive

AC3-1

**WORTHINGTON PUMP AND MACHINERY CORPORATION • HARRISON, NEW JERSEY**

# 7 things you should do to keep prices down!

If prices soar, this war will last longer, and we could all go broke when it's over. Uncle Sam is fighting hard to keep prices *down*. But he can't do it alone. It's up to *you* to battle against any and every rising price! To help win the war and keep it from being a hollow victory afterward—you must *keep prices down*. And here's how you can do it:

## 1. BUY ONLY WHAT YOU NEED

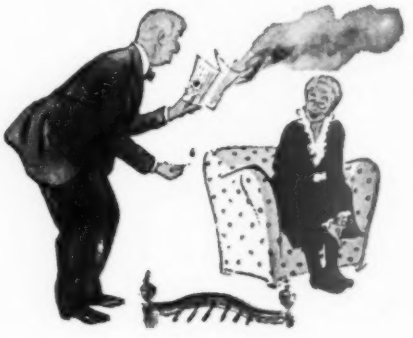
Don't buy a *thing* unless you *cannot* get along without it. Spending can't create more goods. It makes them scarce and prices go up. So make everything you own last longer. "Use it up, wear it out, make it do, or do without."

## 2. PAY NO MORE THAN CEILING PRICES

If you do pay more, you're party to a black market that boosts prices. And if prices go up through the ceiling, your money will be worth less. Buy rationed goods only with stamps.

## 3. SUPPORT HIGHER TAXES

It's easier and cheaper to pay for the war as you go. And it's better to pay big taxes *now*—while you have the extra money to do it. Every dollar put into taxes means a dollar less to bid for scarce goods and boost prices.



## 4. PAY OFF OLD DEBTS

Paid-off debts make you independent now . . . and make your position a whale of a lot safer against the day you may be earning less. So pay off every cent you owe—and avoid making new debts as you'd avoid heiling Hitler!

## 5. DON'T ASK MORE MONEY

in wages, or in prices for goods you have to sell. That puts prices up for the things all of us buy. We're all in this war together—business men, farmers and workers. Increases come out of everybody's pocket—including *yours*.

## 6. SAVE FOR THE FUTURE

Money in the savings bank will come in handy for emergencies. And money in life insurance protects your family, protects you in old age. See that you're ready to meet any situation.

## 7. BUY WAR BONDS

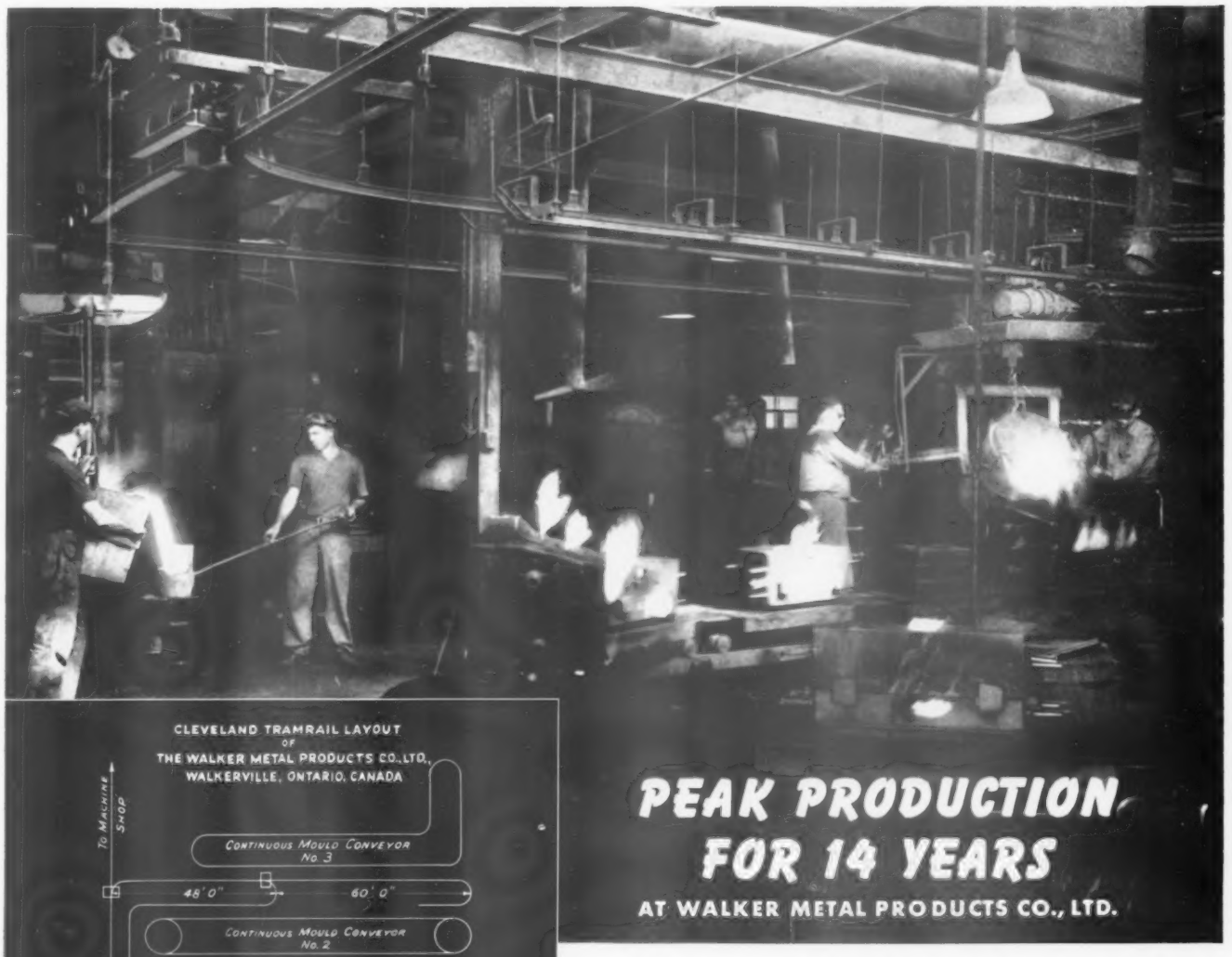
and hold them. Buy as many as you can. Then cut corners to buy more. Bonds put money to work fighting the war instead of letting it shove up prices. They mean safety for you tomorrow. And they'll help keep prices down today.

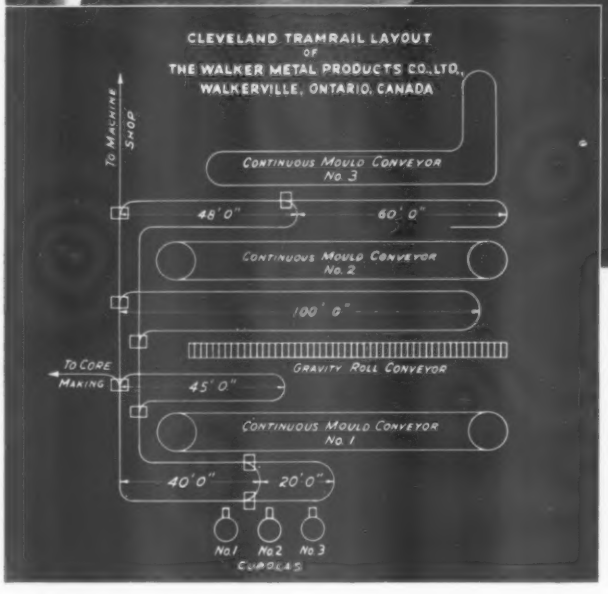
## KEEP PRICES DOWN . . .

*Use it up . . . Wear it out . . .*

*Make it do . . . Or do without.*

This advertisement, prepared by the War Advertising Council, is contributed by this magazine in cooperation with the Magazine Publishers of America.






*This system is subjected to abrasive dirt, corrosive fumes and high temperatures. It is operated close to maximum capacity at all times, and usually is severely overloaded.*

# PEAK PRODUCTION FOR 14 YEARS

## AT WALKER METAL PRODUCTS CO., LTD.

Installed in 1929, the Cleveland Tramrail foundry system at Walker Metal Products Co., Limited, Walkerville, Ontario, Canada, has been worked hard continuously ever since, even through the depression years of 1931-35. Approximately 150 tons of hot metal are conveyed over the main tramrail line daily.

Five one-ton hand-propelled carriers with push-button-operated electric hoists deliver the molten metal directly from the cupolas to the molds on the continuous mold conveyors. The Tramrail System works hand-in-hand with the mold conveyors and makes possible efficient mass production of motor blocks, cylinder heads, and a variety of other castings with minimum labor time per item.

Cleveland Tramrail is quality built and designed to operate successfully under rigorous conditions. Hundreds of foundries are profiting through its use.

***GET THIS BOOK!***

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

**CLEVELAND TRAMRAIL DIVISION**
THE CLEVELAND CRANE & ENGINEERING CO.
1155 EAST 283RD ST. WICKLIFFE, OHIO.

# CLEVELAND TRAMRAIL

## OVERHEAD MATERIALS HANDLING EQUIPMENT

The 12"-38" Adams Jolt Squeezer, Portable Type

# *Make Your Selection From This List*

| SIDE ROD TYPE<br>PORTABLE OR STATIONARY | Squeeze Piston diameter | Jolt Piston diameter | Clearance between Side Rods | Pattern Draw, Adjustable |
|---|---|---|---|---|
| 10"-32" Jolt Squeezer | 10" | 4" | 32" | |
| 12"-38" Jolt Squeezer | 12" | 5" | 38" | |
| 16"-42" Jolt Squeezer | 16" | 6" | 42" | |
| 10"-32" Universal Jolt Squeezer | 10" | 4" | 32" | 3" to 6" |
| 12"-38" Universal Jolt Squeezer | 12" | 5" | 38" | 3" to 6" |

**Also Adams Hand Squeezers—30", 34" or 38" between side rods—Portable or Stationary.**

# THE ADAMS COMPANY

*MOLDING MACHINES · FLASK*

The 10" Post Type Universal Squeezer, Portable Type

# Adams Molding Machines

## POST TYPE
PORTABLE OR STATIONARY

| | Squeeze Piston diameter | Jolt Piston diameter | Pattern Draw, Adjustable |
|---|---|---|---|
| 10" Post Type Jolt Squeezer | 10" | 4" | |
| 12" Post Type Jolt Squeezer | 12" | 5" | |
| 10" Post Type Universal Jolt Squeezer | 10" | 4" | 3" to 6" |
| 12" Post Type Universal Jolt Squeezer | 12" | 5" | 3" to 6" |

**Also manufacturers of Snap Flasks, Slip Flasks, Jackets, Bands, Presser Boards, Bottom Plates, Upsets, Match Frames, Tubular Sprue Cutters and Vibrators.**

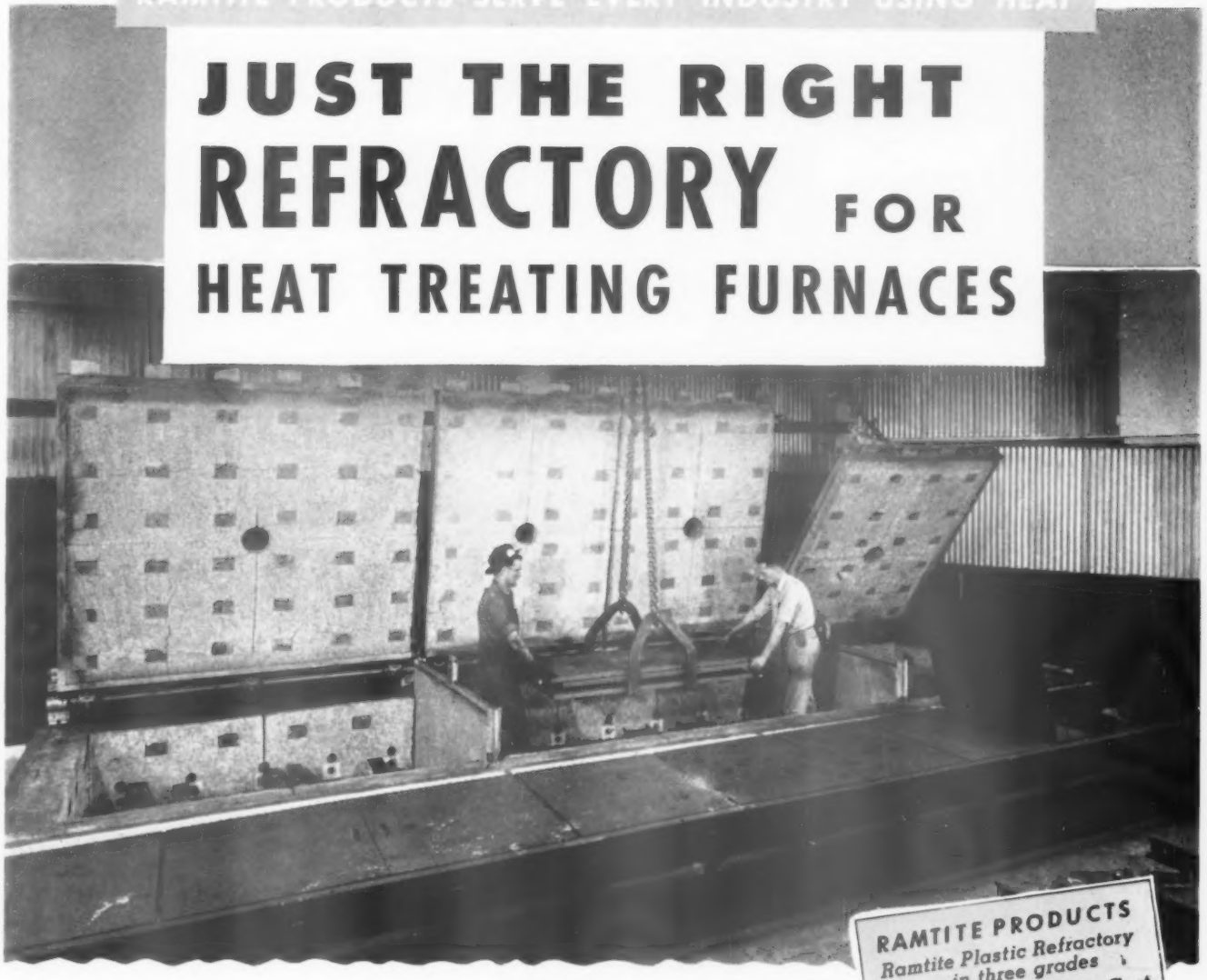
**NY · DUBUQUE, IOWA · U.S.A.**

*K EQUIPMENT Established 1883*

Big Stuff?
DO IT BETTER AND
FASTER ON HERMANS
THEY MAKE THEIR WAY
BY THE WAY
THEY'RE MADE
MOLDING HERMAN MACHINES
HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH, PA.

RAMTITE PRODUCTS SERVE EVERY INDUSTRY USING HEAT

# JUST THE RIGHT REFRACTORY FOR HEAT TREATING FURNACES



**RAMTITE PRODUCTS**

*Ramtite Plastic Refractory ... in three grades*

*Fracto-Crete and Mono-Cast castable refractories*

*Esso Bond air set refractory mortar*

*Hot patch heat set refractory mortar*

*Esso (silicon carbide base) patching and ramming mixes*

*Safe-tie Refractory Anchors*

RAMTITE is ideal for lining Heat Treating Furnaces because (1) it is installed in plastic form and is easily shaped to the proper furnace contour; (2) its resistance to fluctuating temperatures is outstanding; (3) it has a high insulating value; (4) its smooth, dense surface gives maximum reflection of heat to work; (5) there are no joints through which heat can escape; (6) it has an exceptional combination of engineering properties.

Ramtite was used for the side walls and hinged roofs of this normalizing furnace for flame cut steel shapes. A typical Ramtite installation. Send for a bulletin describing the engineering properties of Ramtite.

**THE RAMTITE CO.** ..... *Division of The S. Obermayer Co.*
**1803 SOUTH ROCKWELL STREET** **CHICAGO 8, ILLINOIS**

# RAMTITE

PLASTIC REFRACTORY

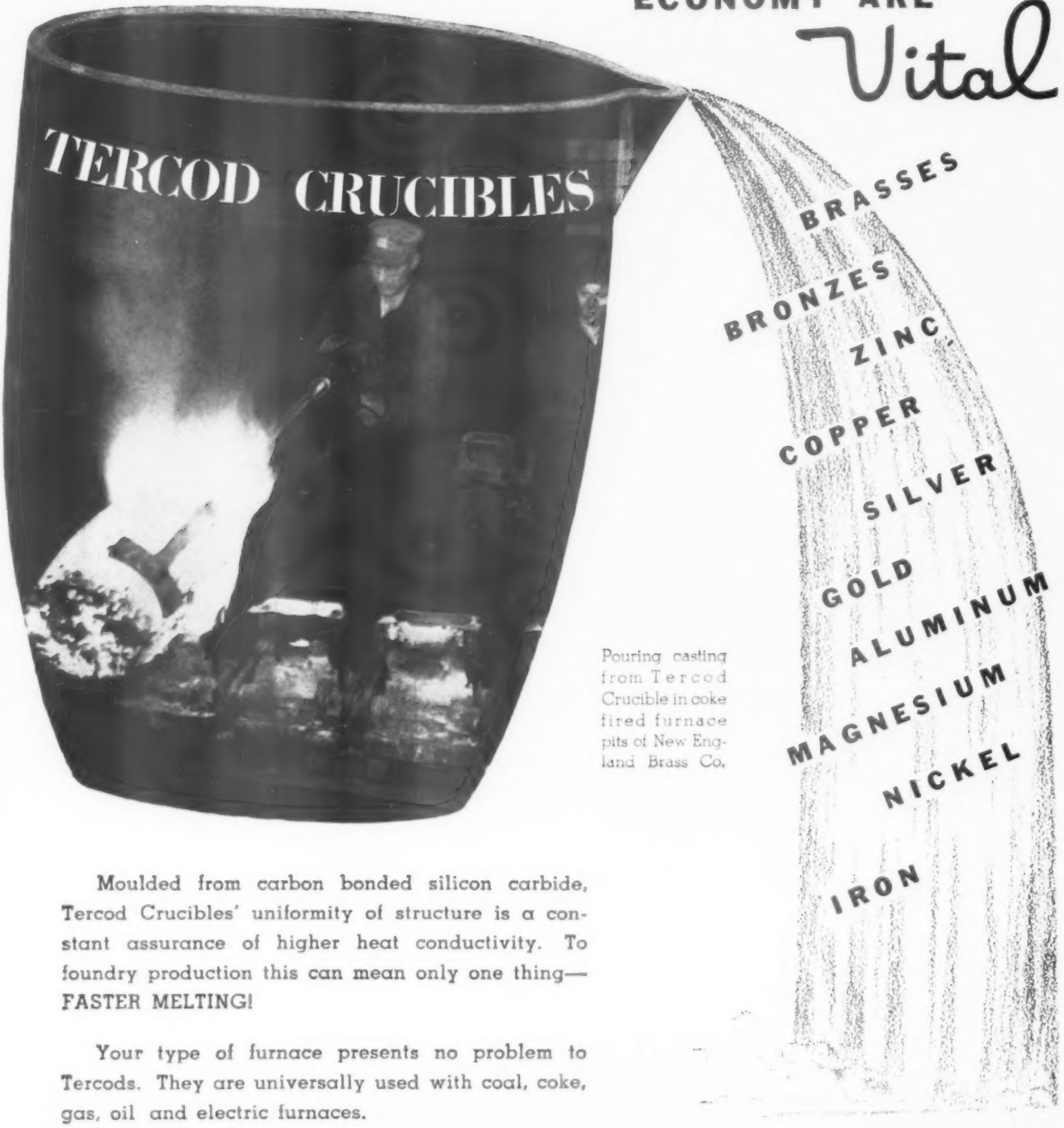
# Wheels for *any* CENTERLESS Grinding Job!

**There are reasons for BAY STATE Superiority through Scientific Manufacturing Control.**

1. FRACTIONAL GRADES — permit a wider range for a more accurate wheel selection.
2. CONTROLLED POROSITY — assures duplication.
3. H9 BOND — offers cooler cutting, greater wheel life, better production.
4. PATENTED INSTRUMENTS — for checking the hardness of grades. *Send for Bulletin.*

**BAY STATE**
**ABRASIVE PRODUCTS CO., WESTBORO, MASS. U.S.A.**

# FOR Every Foundry WHERE MELTING SPEED AND HEATING ECONOMY ARE Vital




Pouring casting from Tercod Crucible in coke fired furnace pits of New England Brass Co.

Moulded from carbon bonded silicon carbide, Tercod Crucibles' uniformity of structure is a constant assurance of higher heat conductivity. To foundry production this can mean only one thing—FASTER MELTING!

Your type of furnace presents no problem to Tercods. They are universally used with coal, coke, gas, oil and electric furnaces.

**ELECTRO REFRACTORIES AND ALLOYS CORP.**

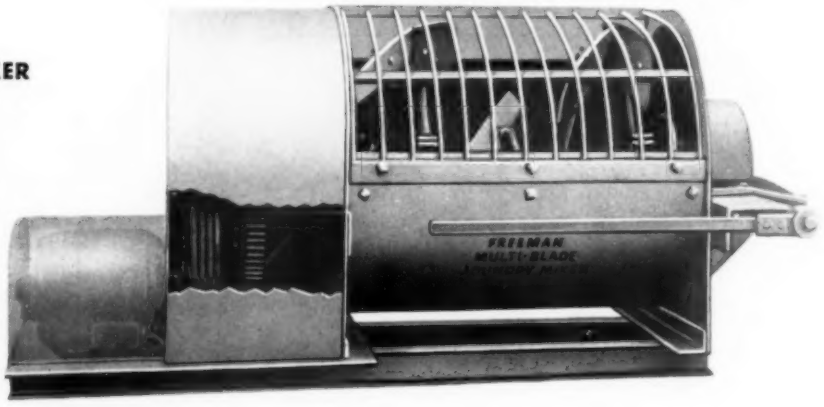
GENERAL OFFICES: ANDREWS BUILDING, BUFFALO, N. Y.

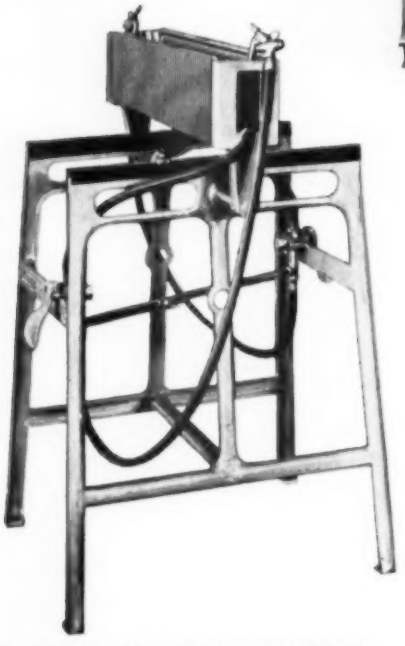
*Manufacturers of Crucibles, Alloys, Stoppers, Refractories, Grinding Wheels*

# 3 LEADERS *in* EFFICIENT FOUNDRY EQUIPMENT

**FREEMAN *Multi-Blade* FOUNDRY MIXER**

Here is a mixer which has everything built-in as standard equipment, and includes many features not even available as accessories on other mixers. Send for a new booklet which explains how differently this mixer is built and just what you may expect of its operation in your plant.



**ROSS CORE DRAWER**

If you are faced with a manpower problem (and who isn't?), remember that highly skilled labor is not required to draw cores on this machine and the more difficult boxes can be drawn just as fast as the easy ones. Many core boxes require no rigging at all. The Ross Core Drawer makes cores come true to size. Write for descriptive folder.

**GAST CORE AND MOLD SPRAYER**

This is a low-pressure, large jet atomizing sprayer, equipped with an air motor. It has a gear driven, paddle agitator for applying any type of wash to either green or dry sand molds or cores. It is regularly used with silica, naphtha or gasoline, talc and synthetic washes as well as the graphite or coke based materials. Wash is kept in suspension by paddle agitator when sprayer is used. Send for the whole story!

## THE FREEMAN SUPPLY COMPANY

PATTERN SHOP AND FOUNDRY SUPPLIES AND EQUIPMENT

TOLEDO, OHIO

# Foundry Industry Should Tell Its Story Of Romance and Service

MANY foundries throughout the country are finding it impossible to meet production schedules for castings, due to the growing shortage of manpower. Draft of foundry workers into the armed services, pirating of workers by other war industries, and inept handling of the problem by various government agencies have combined to create a situation that promises to hamper war production in certain lines. In an attempt to avoid these difficulties many companies have devoted considerable time and effort to the training of skilled and semiskilled workers, in upgrading employes to handle work requiring greater skills, in rigging to permit women to perform many jobs previously reserved for men, and in improving practices and equipment so that production may be carried on with fewer people. Today the shortage of so-called common labor is the chief cause of serious delays in the production of castings for war.

Because castings are basic materials in the construction of many types of war machines, the difficulties which the foundry industry is having in meeting production schedules naturally has become the concern of the procurement branches of the armed services, the War Production Board, the War Manpower Commission, and the War Labor Board. Each has tried to help in some way, but these uncoordinated efforts frequently have had a tendency to complicate the situation and in some instances have resulted in the further slowing of production. An interesting example of how the WMC and the WLB in Cleveland succeeded in multiplying the tribulations of foundry operators in the Central West is presented on page 156 of this issue. More to the point, this material illustrates the type of publicity which has been given the foundry industry, and should sound a warning to management in all types of foundries.

Difficulties in meeting tremendous requirements for castings will be overcome. With the intelligent assistance of government agencies and a combination of foundry ingenuity and developments of the foundry equipment industry, solutions will be found for problems which now appear hopeless riddles. The shortage of manpower is only a passing phase in the upheaval which has plagued the foundry industry since the declaration of war. Even before the present troubles are overcome, something else will appear to command the attention and effort of foundry management. But the impressions that now are being created in the minds of workers and the general public may last a long, long time and may prove far more costly than any of the other difficulties brought about by conversion to war production.

In practically every attempt that has been made thus far to develop ways and means for relieving labor shortages, emphasis has been placed on poor pay and poor working conditions. This has been the theme song in recent meetings which have been attended by representatives of war agencies, labor and foundry management, in a survey of the industry made by a government agency, and in publicity to the general public, such as that referred to previously. If foundries are to operate successfully in the period after the war, every effort must be made to correct the circumstances which result in these unfavorable impressions of the industry.

During recent years much progress has been made in applying good housekeeping practices to foundries. Guided by the Industrial Hygiene Codes Committee of the American Foundrymen's Association, the industry has gone a long way in eliminating objectionable factors and in improving working conditions. To overcome the criticisms which recently have been directed at the industry, the work of furthering good housekeeping must be accelerated. Much can be accomplished without the purchase of equipment, and where equipment is necessary, action should be taken as soon as priority regulations will permit.

As a second step, each organization of foundrymen, and the management of each individual plant should undertake to do a better public relations job. In every city and town where foundries are operated, foundrymen should take the time and make the effort to tell newspaper editors of the essential nature of castings, either in war or in maintaining the civilian economy. Leaders in the community should be welcomed to plants and should be informed of the peculiar problems associated with the production of castings, which result from the particular materials used in the manufacturing processes. Importance of the individual foundry should not be overlooked.

The romance of molten metal and the services of castings to mankind are stories that need to be told and retold.

Frank G. Steinebach
Editor

# Molding LARGE BRONZE PROPELLERS

By Pat Dwyer

AMONG the many citations and awards for outstanding and meritorious service, it may not be out of place to suggest that long before the war was over, Columbia, the Gem of the Ocean, was entitled to wear the crown long held by glamorous Helen, whose face according to Homer launched a thousand ships and sent them surging over the foaming waves to Troy.

However, in this instance the total number does not present any basis for comparison. Assuming an army of 2000 Grecian warriors, a modern Liberty ship could carry them all in one trip, while one or two sister ships of 10,500-tons capacity could carry enough food, equipment and other supplies to keep the army in first class fighting trim from the beginning to the end of the famous 7-year siege described in the Iliad.

Widespread and deserved publicity has been accorded the shipbuilding industry for the manner in which it has risen to the emergency and sent a fleet of ships sliding down the ways all up and down the Atlantic and Pacific coasts, the Great Lakes and the Gulf of Mexico. Comparatively little has been heard of the foundries and machine shops which furnish the immense volume of auxiliary machinery and equipment without which the floating hulls would be of no more practical use than the more or less mythical Greek fleet, chopped up for kindling wood or reposing for the past 2000 years or more on the floor of the Aegean Sea.

Consider the single item of propellers for Liberty ships and tankers. These are manganese bronze, 18 feet 6 inches and 19 feet 6 inches in diameter and weighing respectively approximately 11 and 18 tons, cleaned, machined and ready to ship. Each casting must conform to rigid specifications in physical properties, design, size, shape, weight, thickness, and must pass close and critical inspection by representatives of the Maritime Commission.

Some of the methods and equipment developed and installed for the production of the castings in the Baltimore foundry of the Bartlett-Hayward Division of the Koppers Co., are shown in the accompanying illustrations. This company is the leading producer of Liberty ship propellers and is reported to have been the first to win the Maritime Commission "M" award for propeller production.

Castings from this plant have been shipped to practically every American shipyard engaged in the production of Liberty ships and tankers. Many remarkable features connected with the handling of the contract, including total number made and ultimate destination of the castings, are not available for publication. And besides they are not relevant to the present discussion concerned merely with the foundry technique involved in production of these large bronze castings at the rate of eight per week.

Although the Bartlett-Hayward Co. under various names has been in continuous existence for 111 years and during that time has made iron and bronze castings for a wide range of applications, from stoves to illuminating gas plants and sugar refineries, a ship's propeller never had been included in the miscellany. Consequently, the foundry superintendent and planning department were given a free hand in designing methods and equipment.

Every marine engineer has his own views on propeller design, and every competent foundry superintendent with first-hand knowledge of how propellers are molded in various foundries, has his own ideas of how the job should be done. In the present instance, by starting from

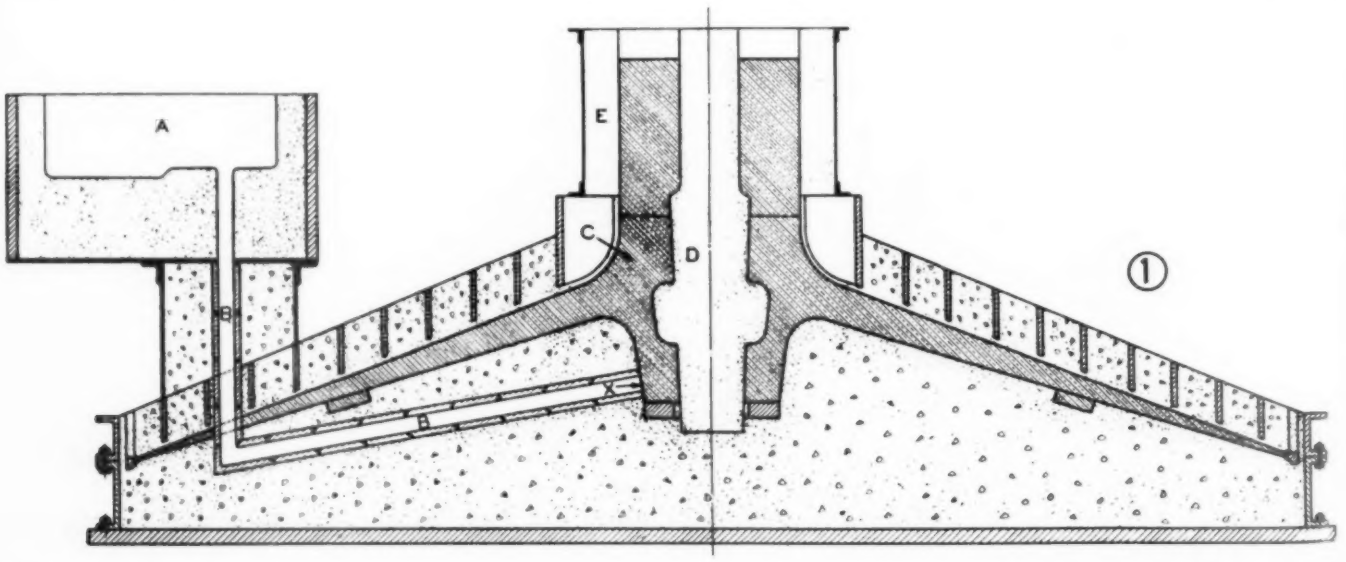
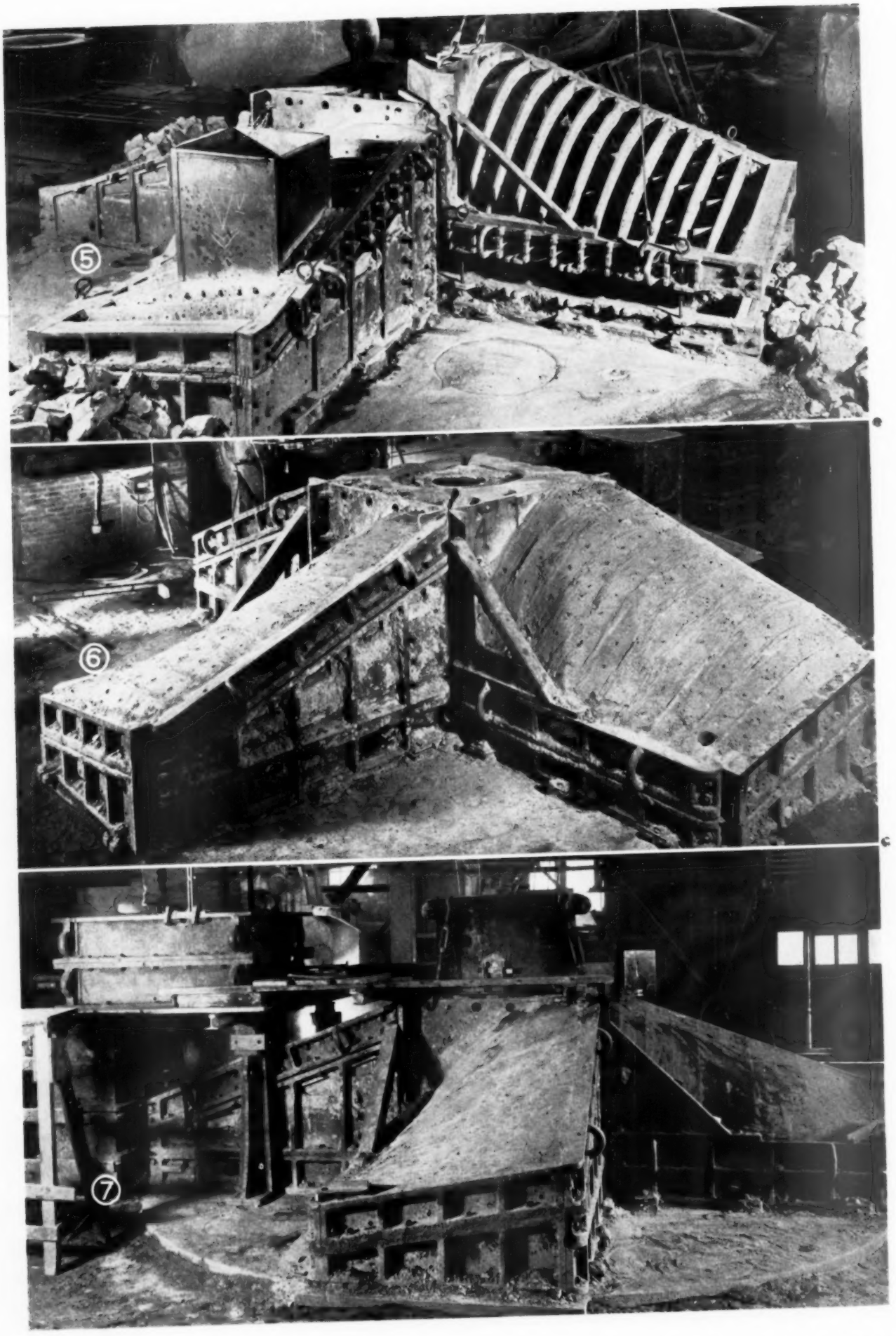


*Fig. 1—Schematic sectional view of nearly all of the special features including the runner basin A, sprue BB and gate in tiles, the center core D and the large shrink head E*

*Fig. 2—Four drags are bolted permanently to a large circular foundation plate. The upper flange on each drag conforms approximately to the parting line on each blade pattern*

*Fig. 3—The drag part of the mold as it appears after the casting has been removed. Before beginning the next mold enough of the rubble is removed to provide a thickness of newly mixed sand under the pattern*

*Fig. 4—The pattern set up in the drag in readiness to having the sand rammed underneath. The hub of the bronze pattern rests on a permanent cast iron circular block*


⑤
⑥
⑦

scratch the foundryman on the one hand was not handicapped by the necessity of using obsolete equipment or antiquated methods. On the other hand he took a gamble and risked his reputation by the introduction of any radical changes.

In this case the adopted rigging followed closely the well-known rule for the bride's costume—something old, something new, something borrowed and something blue. Many men who at first viewed the plan with grave and doubtful alarm, long since have been converted to frank admiration. Visiting foundrymen familiar with propeller molding practice share their view.

The first radical departure from the almost universal practice of rebuilding the mold in a pit, was the decision to assemble the mold on the foundry floor after the manner of any mold made in a flask, and without curbing around the outside or weights on the top.

*Fig. 5—Special wire slings of unequal length are employed for handling the copes*

*Fig. 6—The mold as it appears before the copes are removed and the pattern extracted. The small riser shown in the right fore ground is a vent opening and is closed with a piece of dry sand core and a small plate before the casting is poured*

*Fig. 7—The finished mold clamped and secured and with runner basin and shrink head ring in place*

The second departure from orthodox practice was the decision to use a complete pattern and thus eliminate the time required in shifting a single blade from drag to drag to form a complete mold. This decision, of course, was based on the fact that this was a repetition production job involving a great number of duplicate castings. Expense of patterns and rigging properly considered prohibitive when only one or two castings are required, becomes practically negligible when the castings are made in great numbers.

Preliminary work included making patterns and afterward molding and casting the sides and ends for six sets of flasks, each set made up of four copes and four drags. The joint line of each of the four sections in the flask assembly followed approximately the contour of the propeller blade edge. The bottom face of the drags rested on the foundation plate. Details of the plate will be referred to later.

Bars closely following the contour of the propeller blade are bolted to the cope sides and are about 10 inches deep. The greater part of the blade is covered in this manner. An extension is erected on the cope in the vicinity of the propeller hub and is provided with vertical chuck bars to hold the sand. The two outside plates on the nose of each cope approach closely to the hub of the pattern. A space 1½ inches wide separates the plates on adjoining copes. This space, instead of the usual vertical sand-to-sand joint, facilitates removing the copes one at a time after ramming has been completed. It also facilitates returning the copes to their respective drags after the pattern has been removed and the molds blacked and finished. After the mold is assembled the spaces between the cope noses are rammed full of sand. The top of the plates and chuck bars are flush with the top of the propeller hub and form a firm foundation for the riser section of the mold formed inside a sheet steel ring or drum and placed in position after the remainder of the mold is completely assembled.

Remaining equipment includes the metal pattern for the propeller and the foundation plates. A wood pattern of the hub and single blade was made first with allowance for double shrinkage. A mold was made in the manner usually followed in shops where this sectional type of pattern is employed. The pattern was mounted on a spindle and swung into place in succession in the four flasks. Four points of contact 90 degrees apart were set up, one in each drag to locate the blade properly each time it was moved. To facilitate setting the pattern, a foot was attached to the bottom near the tip of the blade. This foot rested on the foundation plate and with minor adjustment served to locate the four blades accurately in a horizontal plane. The casting was poured from a manganese bronze heat and after it has served its purpose as a pattern will be available as a propeller casting on some ship where its present oversize shrinkage allowance will not be a factor of any importance. Of course the present thick edge will be chipped and ground.

### Molds Built on Heavy Plates

Heavy, substantial cast iron foundation plates, 4 inches thick and 22 feet in diameter were cast in open sand molds on the foundry floor. The foundry is equipped with two cupolas for the production of gray iron, and with a battery of 18 oil fired furnaces for melting brass and bronze. The cupolas are idle temporarily since almost the entire capacity of the main bay of the foundry is devoted to the production of bronze propeller castings. A considerable amount of floor space is required around each 22-foot diameter unit for handling the four copes in the cycle of operation from shakeout to shakeout. The sequence of operation will be taken up in detail later. Foundation plates and drags remain permanently in place.

A level sand bed was prepared on the foundry floor for the mold for each of the foundation plates. From a temporary center a long wooden arm with a segment of a circle at the outer end was moved around, and sand was banked against the segment until the entire circle was completed. A wooden templet corresponding to the shape and position of the four drags was laid on the face and the outline was scribed in the sand. When the templet was removed a number of slot cores, similar to those placed in machine tool face plates, were set in place as shown in the accompanying freehand sketch, not drawn to scale and exaggerated in places for greater clarity. These slots in the foundation plate were designed for the reception of the bolts by which the drags are anchored down solidly. Corresponding slots were formed in the lower drag flanges.

Four small circular islands 3 feet in diameter also were built as indicated, partly to lighten the plate, but principally to form openings for attaching the crane chains employed in reversing the plate after it was cast. Incidentally, for lack of head room, it was necessary to dig a trench 3 feet deep in the floor at one side of the plate and let the lower edge of the plate slide into it during the roll-over operation.

The six foundation plates (*Please turn to page* 190)

# Pours Triplex Steel on Conveyor

By A. H. Allen

TRIPLEX melting in cupolas, bessemer converters and acid electric arc furnaces; and almost complete conveyorization of materials handling including the Ford technique of "bringing the molds to the metal" are highlights of a principal section of a new steel foundry now in operation at the Rouge plant of Ford Motor Co., Dearborn, Mich., for production of carbon steel and armor steel castings to be used in ordnance and aircraft equipment.

Housed in an entirely new building structure, the foundry has a projected capacity of about 10,000 tons of finished castings a month. Range of castings produced covers a wide variety, from small parts up to a maximum size of about 1500 pounds, grouped in four classes—large castings poured in the floor molding section, those made by centrifugal casting, those poured on mold lines served by sandslingers, and finally smaller castings made on an adjacent line served by conventional jolt squeezer molding machines.

Arrangement of the foundry is unusual in that the building itself is approximately four stories in height. Melting operations are on the second floor level, except for the cupolas which are located on what roughly corresponds to a mezzanine of the sec-

*Fig. 1 (Left)—Large ladle of steel suspended from the crane is being poured into the electric furnace. Fig. 2 (Left below)—Molten metal from one of the cupolas in the new foundry is tapped into a desulphurizing ladle*

ond floor. Charging level of the cupolas is at the top of the building, charging buckets being loaded and weighed on a closed conveyor loop at the ground floor level and then hoisted up the equivalent of four floors by crane to the charging level.

The pouring lines are on the second floor level, adjoining a line of electric furnaces—several 12-ton and others 4-ton capacity. The floor molding section is on the ground level, this portion of the building being open to the roof except for a balcony at one end on which are located the electric furnaces serving that department. The balcony level is, of course, the same as the second floor level in the other part of the building. Several electric furnaces are provided to serve the centrifugal casting line, and other 12-ton units are located opposite the other molding and pouring lines. In the latter group normally only a portion will operate at a time, permitting one furnace to be down for repairs continuously.

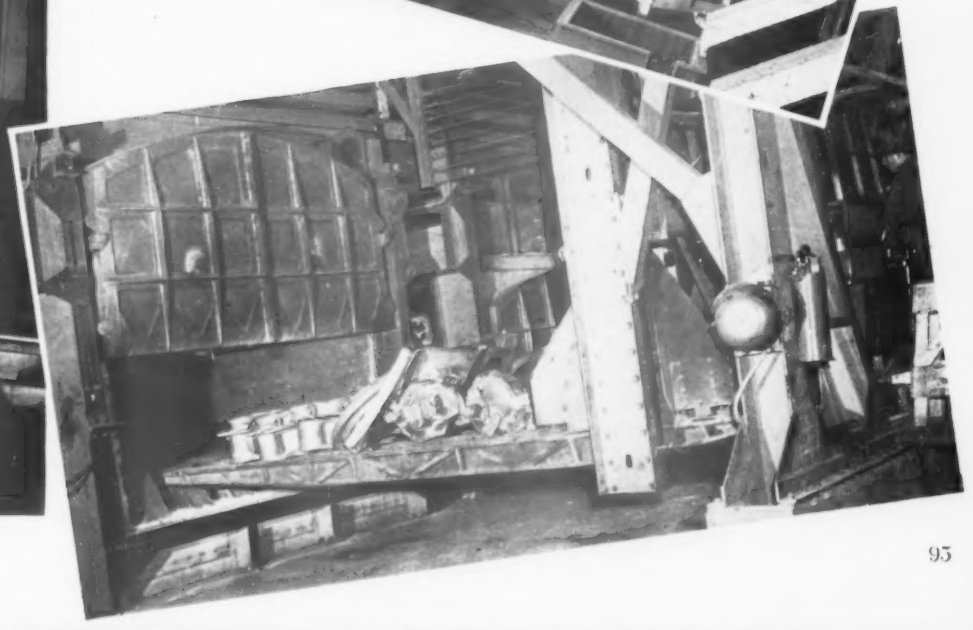
Several 96-inch hot-blast cupolas lined to 72 inches, are installed about in the same line with the battery of electric furnaces, at one end of the building. With capacity of 22 tons per hour, two of these melting units are sufficient to keep four bessemer converters blowing, so this is the normal operating procedure. Cupola charge is roughly 25 per cent pig iron, 25 per cent purchased scrap and 50 per cent return scrap. The cupolas tap into 13,000-pound desulphurizing ladles, shown in Fig. 2, where approximately 200 pounds of purite is added per ladle charge, sufficient to reduce sulphur content to 0.05 per cent maximum.

From the desulphurizing ladle, iron is run off into an 8-ton transfer ladle handled by overhead crane which takes the hot iron (tapping temperature around 2900 degrees Fahr.) to the bessemer converters for blowing. These acid-lined sideblow converters are ranged in line opposite the cupolas at one side of the foundry building. Time cycle on the bessemer blow is about 28 minutes—4 minutes for charging, 20 minutes blowing and 4 minutes tapping. When the lining is new, the converter will handle about 9000 pounds of iron and as it wears away, this is gradually increased until after 30-35 blows the charge grows to around 16,000 pounds. This number of blows is the average life of the converter lining, after which it is replaced.

Blowing period is judged by eye and when the carbon flame has colored to the proper (*Please turn to page* 188)

*Fig. 4 (Right)—Partition in basin prevents entrance of slag into mold. Fig. 5 (Below)—One of the rotary hearth sand reclaiming units. Fig. 6 (Bottom)—Homogenizing furnace holds a 10,000-pound load. Castings are for the Ford-built M-4 tank and are placed in the furnace by a charger*

*Fig. 3 (Below)—Steel is poured from the electric furnaces into small ladles. The ladles suspended from chain hoists on overhead rails are moved quickly to the continuous mold lines at the extreme right*



By WILLIAM G. GUDE

# ALUMINUM CASTINGS

## Poured in Cores

COUNTLESS examples of improvement in manufacturing methods among various types of metalworking plants have been cited during the recent and current period of industry's concentration on war production. These developments, reflected in the rapidity with which manufacture of war materiel has expanded, have been contributed to liberally by castings producers as well as by those who fashion the foundry products into finished weapons.

An outstanding instance of improved technique in production of aluminum aircraft castings is the practice followed by Acme Pattern & Tool Co. Inc., Dayton, O. In the fall of 1941, this company—established in 1920 as the Acme Pattern Co.—completed a large foundry across the street from its then existing plant. This addition enlarged considerably the company's foundry division which, since 1927, had been engaged principally in the production of pattern and matchplate castings.

The new plant pours a variety of aluminum castings, although a large part of its output consists of castings for Rolls-Royce aircraft engines—including the upper half of the crankcase, cylinder head, wheel case, and supercharger—and parts for marine engines, both of which are being built by Packard Motor Car Co. Daily melting capacity of the foundry is 30,000 to 60,000 pounds.

Usual molding practice is followed in the production of the smaller miscellaneous castings at this plant. Benches and machines where the molds for such castings are made are located at one end of the main foundry bay, as shown in Fig. 4. However, intricate cores are required for all of the engine castings, and various molding problems had to be overcome before the present procedure was perfected for casting these parts.

For instance, the wheel case originally was cast in a mold requiring a flask 4-feet square. In the as-cast condition this casting weighed 228 pounds, although the finished machine casting weighs only about 28 pounds, and even after rough cleaning the weight is down to less than 40 pounds. This wide spread between the as-cast and finished casting weights was reduced considerably when the company was successful in pouring directly in the core assembly. By this method the amount of metal required to pour each casting was reduced from 228 to 82 pounds, a cut of nearly 65 per cent. In addition, dimensions of the assembled core are only a little more than one-half those of the flask originally used. Compared with former practice, this means that the same amount of metal now can be poured into more than two and a half times as many castings without any marked increase in space on the pouring floor.

Similar practice was developed in casting other parts of the engine, and the success met in pouring in the cores has resulted in the adoption of this method by Packard as well as by other foundries which are engaged as subcontractors in supplying these castings. (An article describing the Packard foundry appeared in the April

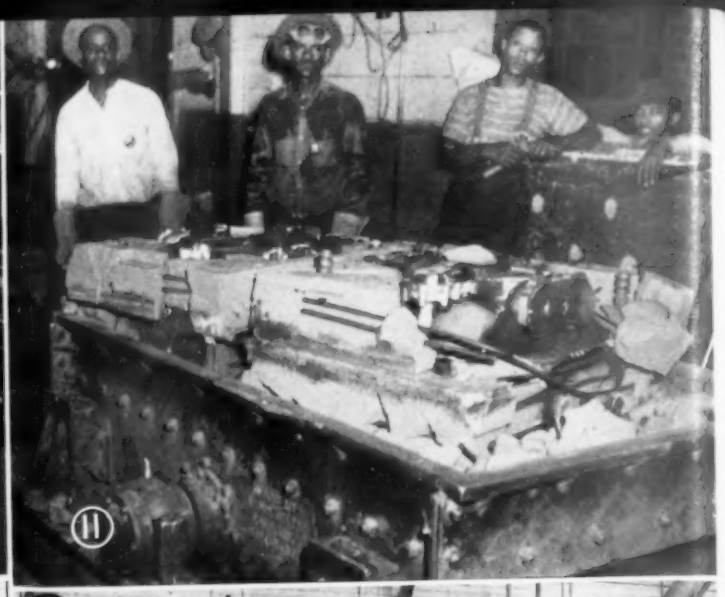
*Fig. 1—Core for super-charger being poured through two gates. Note recording potentiometer for keeping permanent record of temperatures at which each heat is poured*

*Fig. 4—General view of main bay of foundry. Bench molding of small castings in left foreground; aisle for pouring large castings in center; core making, baking and assembly departments in rear. Large skylights and fluorescent lighting provide a well illuminated plant*

*Fig. 5—Battery of roll-over molding machines used for making large cores. Core shown at right is for marine engine manifold, those at left are for aircraft engine cylinder head. Fig. 6—Another view of engine casting cores being molded with roll-over machines. At right is top section of cylinder head core. Wheel case core is being made on adjoining machine*

*Fig. 2—Building up the components of the cylinder head core assembly. Jigs are used to insure accurate alignment of the various sections. Fig. 3—Completed cylinder head cores. These castings are poured directly in the core through two gates located on opposite sides of the core and midway its length. Each of the six large wells at the top of the core connects with four risers*

⑦


⑪

⑧

⑫

⑨

⑩

⑭

issue of THE FOUNDRY). The upper crankcase is one exception to the practice of pouring entirely in the core. In this case the drag is green sand, but the cope consists of two cores which contain pouring runners and shrink heads. This change from a green sand cope has made available for other work a large roll-over machine previously required to ram the cope flask for this casting. The machine now is used in making molds for marine engine manifolds, and in this instance also the cope flask has been replaced by cores.

The design of the castings naturally calls for an extensive core making and assembly department. Hand and machine molding and core blowing methods are followed, with the copes and drags made in sections on combination jolt, roll-over machines, as shown in Figs. 5 and 6.

Composition of the sand mixture for the cope and drag consists of 630 pounds of lake sand, 7 pounds of oil and 14½ pounds of cereal binder. Proportions for the wheel case cores are the same except for the oil, 3½ pounds being used. For the jacket and side rail cores of the cylinder head the oil addition is raised to 10 pounds, with sand and binder content the same as given previously. Typical analysis of this latter mixture is as follows: Moisture 1.68 per cent; dry permeability 195; tensile strength 107.5 pounds per square inch. Cores are baked in eight rack type ovens and in one vertical continuous oven, the latter being used principally for small cores.

Women are employed extensively on core work both in finishing baked cores and in core assembly. They have been found to be particularly adapted to this type of work, and are successfully filling a number of jobs formerly handled by men. Assembly of small cores by women workers is shown in Fig. 7. Fig. 8 shows another section of the core assembly department with women finishing the jacket cores for the cylinder head.

Because of the large number of individual pieces making up the assembly for the head, crankcase and wheel case cores, care must be exercised in joining them together. Fig. 2 shows the assembly of cylinder head cores and the use of jigs which insure accuracy of alignment during the assembly operation. Completed cores are shown in Fig. 3. After assembly, completed cores are placed on skids for transfer to the pouring floor and later to the shakeout.

Large risers are provided on all the engine castings in order to assure adequate feeding to various sections. For example, the cylinder head as cast weighs about 215 pounds, but approximately 130 pounds of this consists of gates and risers. Twenty-four short risers are evenly apportioned over the head, with groups of four risers joining six large wells into which metal is added for feeding purposes. Some idea of the size of these wells may be obtained from the core assembly shown in Fig. 3.

Metal used in making the castings is a British alloy, the composition being the same as that employed by other producers of Rolls-Royce engine parts in this country and in Great Britain. Melting is accomplished in 1000-pound gas-fired tilting furnaces. The plant also is equipped with 450-pound furnaces. Nitrogen gas is used for fluxing the aluminum melt, in order to remove oxides and gas. This operation requires about 15 minutes with the metal temperature at 1200 degrees Fahr. After fluxing, the temperature is raised to slightly above 1400 degrees before the furnace is tapped. Pouring is done at about 1380 degrees.

A careful check is made of composition and temperature of each heat. Recording potentiometers located on the pouring floor, as seen in Fig. 1, provide a permanent record of the temperature at which each ladle is poured, and identifying heat numbers are stamped on a riser of every casting before complete solidification. This number is transferred permanently to the casting after the shakeout. Test bars also are (*Please turn to page* 178).

*Fig. 7—Women have successfully taken over jobs formerly filled by men in finishing and assembling small cores. Fig. 8—Jacket cores for cylinder head receiving finishing touches from women workers. Department for final core assembly is in immediate background. Fig. 9—Aluminum alloy is melted in 1000-pound tilting furnaces. Temperature control room is located at far end of melting department. Fig. 10—Pouring wheelcase core. Two ladles are poured simultaneously through gates at diagonal corners. Fig. 11—Shakeout accommodates two wheelcase castings. Fig. 12—Sand blasting various engine castings. Parts are blasted before removal of gates and risers and prior to final inspection. Fig. 13—Castings are heat treated in electrically heated ovens 5 hours at 550 degrees Fahr. Fig. 14—Target gage used for checking dimensions of upper half of crankcase. Castings also are tested hydraulically. Fig. 15—Chipping of upper half of crankcase (left) and cylinder heads (right) is minimized by use of electric welding and drilling*

# Institute of BRITISH FOUNDRYMEN

## *Holds Annual Meeting*

By VINCENT DELPORT
European Manager
The Foundry

ANNALS of the Institute of British Foundrymen were marked this year by the holding of its fortieth annual meeting. The war has brought no interruption, but the meetings last only one day, and they are held in London. This year's meeting took place at the Waldorf Hotel on Saturday, June 26. Members from all over the country attended, and Scotland was well represented in support of the election of one of the most prominent members of the Scottish branch, Daniel Sharpe, technical executive, Federated Foundries, Ltd., as president of the institute.

The business meeting opened the proceedings in the morning, with Maj. R. Miles, director, Head, Wrightson & Co., Ltd., president, in the chair. The annual report disclosed that total membership as at April 30, 1943 was 2602, as against 2407 as at April 30 of 1942. The London Branch headed the list with 403 members and is now the largest branch of the institute. As far as could be recorded, 76 members of the institute are serving in the British forces.

Following presentation of the report, the president announced the award of medals. The Oliver Stubbs gold medal was awarded to C. H. Kain, a director of Lake & Elliott, Ltd., where he holds the position of metallurgist. Mr. Kain has presented many papers to the institute and he was the author of the British exchange paper for the A.F.A. in 1942. He has been convener of the Steel Castings Subcommittee of the Technical Committee of the institute since 1935 and was president of the London Branch in 1933-34.

The E. J. Fox gold medal was then presented to W. B. Lake, managing director of Lake & Elliott, Ltd., past president of the institute (1939-41). The presentation was made by the founder of the award. In handing the medal to Mr. Lake, Mr. Fox recalled the outstanding services rendered by the recipient to the foundry industry and to the institute. Mr. Lake, who is well known to readers of THE FOUNDRY, has been responsible for many technical developments, dating back to crucible melting, and he has contributed much to the use of the electric furnace in foundry melting. In replying, Mr. Lake paid tribute to the assistance he had received in the early days from the late Daniel Wilkinson, and later from Fred Melmoth. He also referred to the help he had had from Daniel Sharpe and Colin Kain.

The president announced the award of the Meritorious Services medal to C. Hares, honorary secretary of the recently formed Bristol Branch, which he helped to establish as an offshoot of the Wales & Monmouth Branch.

The following diplomas were also awarded:

J. Vickers, East Midlands branch, for a paper on "Aero Engine Castings."

F. Dunleavy, East Midlands branch, for a paper on "Foundry Technique in Relation to Certain Pressure Castings."

W. Montgomery, Scottish branch, for a paper on "Acid Resistance and Technical Control in Enameling Plants."

W. Gladwell, East Midlands branch, for a paper on "Radiography As an Aid to Foundry Technique."

W. Brown, Lancashire branch, for a paper on "Essential Points in the Production of Non-Ferrous Castings."

The president then announced that Barrington Hooper, managing director of Industrial Newspapers, Ltd., proprietors of *The Foundry Trade Journal*, had offered to provide for an annual medal to be presented to the author of the best paper given before the institute each year. The first award of this medal, which will be known as the British Foundry medal, will be made in 1944.

The meeting proceeded with the election of officers for the year 1943-44. The president proposed Daniel Sharpe as his successor and this proposal, seconded by H. Winterton, past president, was carried unanimously. D. H. Wood, managing director Constructional Engineering Co., Ltd., was elected senior vice president, and J. Gardom, foundry consultant, Ripley, Derby, and chairman of the Technical Committee of the institute, was elected junior vice president.

L. W. Bolton, convener Melting Furnaces Subcommittee; Vincent Delport, European manager, THE FOUNDRY and past president of the London Branch; Barrington Hooper, past president of the London Branch; E. Longden, past president of the Lancashire Branch, and P. A. Russell, convener of the Cast Iron Sub-committee, were re-elected members of the council, for a period of 2 years. R. B. Templeton, past president of the London Branch, was elected on the council for one year in place of Daniel Sharpe. Maj. R. Miles, re- (*Please turn to page* 179)

# FOUNDRY METALLURGY *in the* CASTINGS INDUSTRY

*By John W. Bolton*

TREMENDOUS wartime production and usage of the light alloys (aluminum and magnesium base) have attracted the attention of the public and have increased the interest of capital and of management. The lightness of these metals, their machinability, the greatly expanded production capacity now available, and the lowering in cost per pound to the founder or other user are a combination which suggests expansion in domestic usage after the war. Producers of other metals recognize the competitive possibilities, and some are disturbed thereat. In turn, all metal producers must needs keep a wary eye on the developments in plastics, in ceramics, in laminated wood constructions and the like.

The author has had limited practical experience in aluminum—mainly two alloys in sand castings for pressure parts—and none in magnesium. Beside this the *Transactions* to date are not a particularly good repository of information relative to metallurgical progress in this field. These facts make a representative and balanced review difficult.

In the case of magnesium the paucity of papers is not difficult to understand. It is stated by Brooks that magnesium alloy sand castings were introduced on a practical scale in 1929. An annual production of but a million pounds was reached in 1939. Since that time increase in production has been indeed great. An early paper[25] before the association was that of Brooks and Gann followed by that[26] of Brooks and Winston. These useful contributions plus "Recommended Practices[27]" constitute the total. Much undoubtedly is being done in many foundries now. It is hoped that, when politic, records of these developments will find their way into the *Transactions*.

In the case of aluminum the period of 1920-1929 saw contributions from several sources. The paper[28] by Basch is a typical discussion of new developments in alloys, their handling, and their properties.

In the period 1930-1942 inclusive there have been but nine papers. Literature (elsewhere) and patents in this field have been extensive, in contrast to the paucity of original or development papers in the *Transactions*. We must go to Rowe and Ginderich to find a direct treatment of general problems[29], although here and there useful comments appear, for example, those of Gillett[30]. Whether this situation is a result of foundrymen at large depending on research data divulged by one large and excellently equipped group is debatable. The war has brought aluminum into many foundries, and it well may bring increased catholicity and many new developments. Here again the story can be better told at a later date.

A new division, to deal specifically with the light alloys, has been organized. This closer community of interest well may lead to more extensive activity within the association.

The alloy AN-QQ-A376-2 (formerly known as 11307-HT-2) or Alcoa 355 is listed as Alloy 1, Heat Treatment 2 in Reference Table 88 p. 299, *Cast Metals Handbook*. It is essentially a 5 per cent silicon alloy modified by other elements, and age hardening.

A minimum tensility of 32,000 pounds per square inch and a minimum ductility of 2 per cent are prescribed. Because of this alloy's lightness, the tensility, weight for weight, is somewhat better than that of the more common grades of cast steel. Two per cent elongation appears rather low. The error in fitting test bar ends together is appreciable. A minimum ductility of 2 per cent may well mean an actual or true elongation of 1 per cent or a little over.

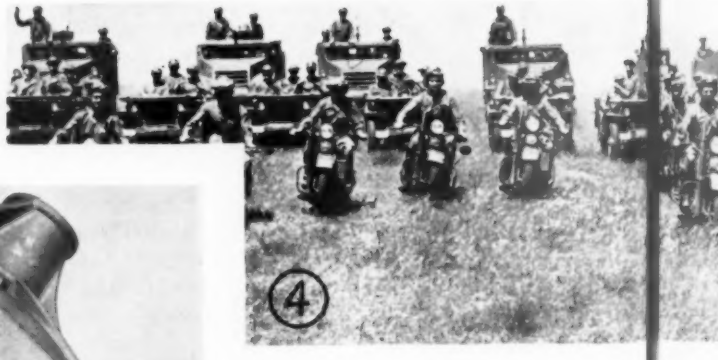
The AN-QQ-A376-2 alloy finds considerable usage where weight is a consideration. That this alloy and other aluminum alloys of low ductility are used successfully where stresses are far from static is a partial answer to "ductility crazy" users of metals.

Under favorable conditions a tensility of 40,000 pounds per square inch and an elongation of about 5 per cent may occur. Composition and heat treatment are controlled to very close limits. Therefore much of such variation must be attributed to other factors in foundry science and art. The spread from minimum to maximum is some 25 per cent in tensility and 250 per cent in ductility. One can expect considerable spreads in some alloys used as cast, because variations in cooling rates in the mold are in themselves heat treatments. However, in heat treated alloys, cast carbon steel for example, a frequency chart will show the bulk of tensilities lie within a range of 10 per cent. Following this reasoning it might seem that prescription of 38,000 minimum tensility and 3.5 per cent minimum elongation might at some time be possible with this aluminum alloy. Such improvement would be well worth while in any alloy, and enhance its competitive position relative to metals produced by rolling or forging.

Let us consider what has happened in another field. Within the last 20 years specifications for the now largely proscribed 88-10-2 bronze have been raised from 30,000 pounds per square inch to some 40,000 pounds per square inch minimum. It is a (*Please turn to page* 192)

**This is the third and last installment comprising the first Foundation Lecture of the American Foundrymen's Association. The first installment, in the July issue, described metallurgical developments in gray iron. Cast steel, malleable iron and nonferrous metals other than light alloys were discussed in the August issue.**

*Fig. 1—M-7-105mm howitzer antitank artillery piece which used a number of malleable castings. Fig. 2—Castings used in the gun elevating mechanism, the cover at the left, the base at the right, the bearing spacer and housing at the top and the lower, cap and retainer at the bottom. Fig. 3—Tank steering gear housing*



# Malleable Iron Castings IN ORDNANCE

By LT. COL. J. H. FRYE
Chief, Materials Section
Service Branch, Technical Division
Army Ordnance
Washington

IN TIME of peace malleable iron was not well known in ordnance. The necessity for its extensive use did not seem to exist. Of course, in army trucks, differential carriers, cases, bearing caps, steering gear housings, and other parts, were of malleable, but seldom were identified as such. Illustrative of some general peacetime uses, also of mechanical properties, is a reproduction of one of a pair of technical display cabinets, Fig. 11, which was supplied to a number of engineering schools by the Malleable Founders Society.

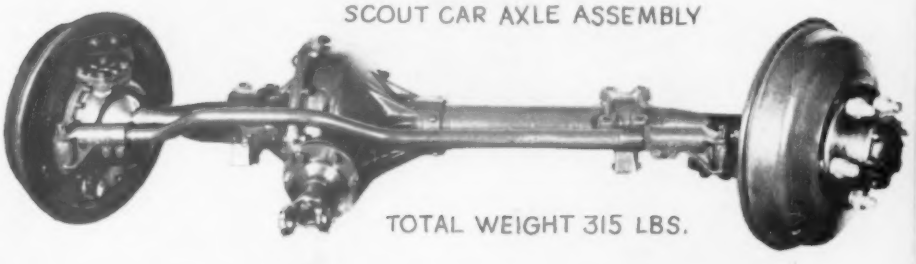
When rapid preparation for mechanized warfare on a tremendous scale became imperative, problems of material and production assumed gigantic proportions. Metal conservation and the importance of conserving machine tools and man-hours became of paramount importance. Among the materials, with the possibilities of which many of us in ordnance became impressed, was malleable iron. Some of us had a certain degree of familiarity with the product, and others became better acquainted with it through the co-operation and contacts with the industry's representatives and through the arsenals and the ordnance districts. Malleable possesses the advantage inherent in a cast part in that it may be cored and cast into intricate shapes with a minimum use of metal. At the same time, lack of necessity of removing surplus metal saves machine tools and man-hours. A further contribution to this saving is the ease and speed with which malleable iron can be machined.

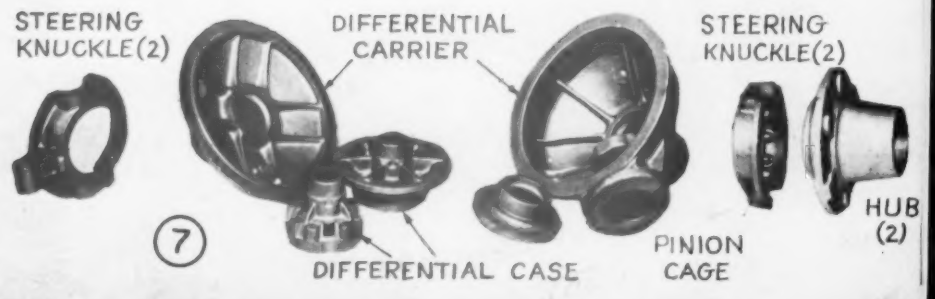
The physical properties of normal malleable iron are indicated in the present revision of Federal Specification QQ-I-666 as follows:

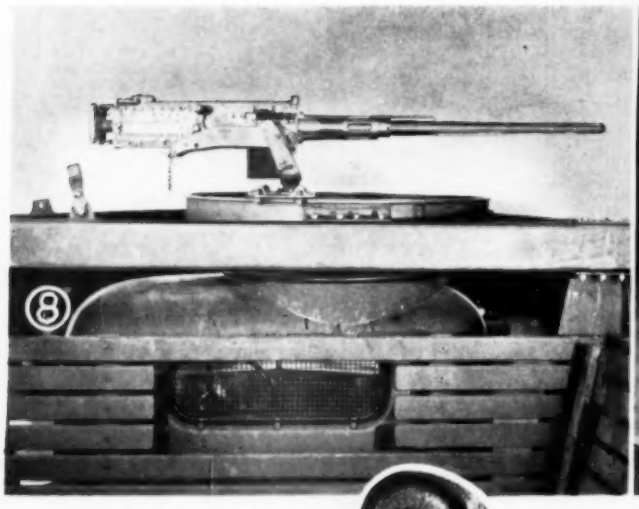
| | Ultimate Strength (min) | Yield (min) | Elongation (min) |
|---|---|---|---|
| Type A | 53,000 psi | 35,000 psi | 18.00% |
| Type B | 50,000 psi | 32,500 psi | 10.00% |

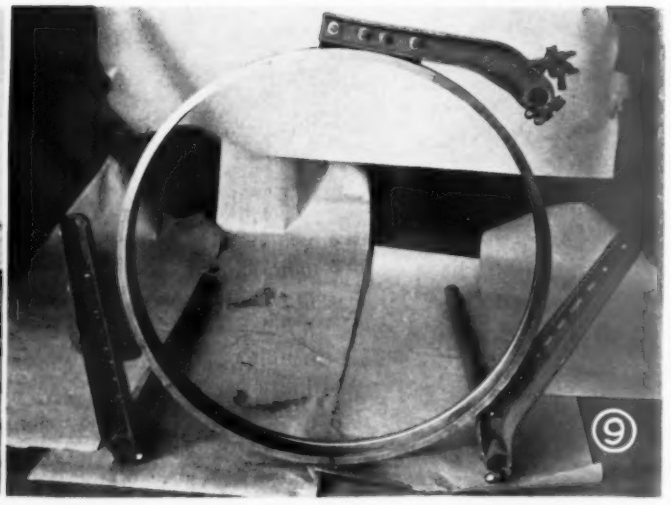
The question of toughness and resistance to impact is quite well illustrated by the photograph of the two eye-bolt lifting plugs shown in Fig. 10. The manner in which one plug has been battered has resulted in a substantial closing and elongation of eye without fracture. Use of malleable iron in this application has effected a saving of at least ½ pound of metal on each plug, important not only from the standpoint of metal conservation, but also when considering weight reduction in shipping heavy ammunition abroad. The weight reduction has, of course,

*Fig. 4—Malleable castings are used in jeeps, scout cars, half tracs and motorcycles. Fig. 5—Malleable iron steering knuckle parts for use in connection with front wheel drive. Fig. 6—Malleable iron hubs and frame members for motorcycles. Fig. 7—Differential carriers, cases and bearing caps of malleable iron*









*Figs. 8 and 9—Malleable iron used in motor vehicle gun mount. Fig. 10—Eyebolt lifting plugs. The one at the left has been battered to show the resistance to impact of malleable cast iron*

been effected by coring needless metal from the interior of the plug. Also bar stock has been saved and machine tool time and man-hours reduced by the greater ease of machining the malleable casting, as compared with the forgings originally used.

In the production of machine gun mounts and pintles, malleable iron has replaced steel to advantage. In the production of the Oerlikon 20 mm gun mount, thousands of tons of strategic copper have been saved by the use of malleable iron in place of bronze castings. Of no little importance, too, is the saving in cost. With malleable use it was not even necessary to reduce machine speeds and feeds. Also, in the case of the cleaning staff used in anti-aircraft guns, the fittings of which were originally machined from brass bar stock, are now of malleable iron. As a result, 10.46 pounds of brass are saved on each staff. In place of this material, but 4.99 pounds of malleable iron castings are required. Again machine tool time and man-hours were saved.

In the case of the Bofors 40 mm anti-aircraft gun grip, an 18 pound malleable iron casting replaced an assembly of forged parts on which had been necessitated a metal removal loss of 73 per cent. Substitution of malleable iron reduced the metal removal loss to 32 per cent, saving machine tools, man-hours, metal cost and time. In a similar manner a mortar gear case, originally machined from a solid forging was made of malleable iron and passed all tests. By coring the parts, (*Please turn to page* 162)

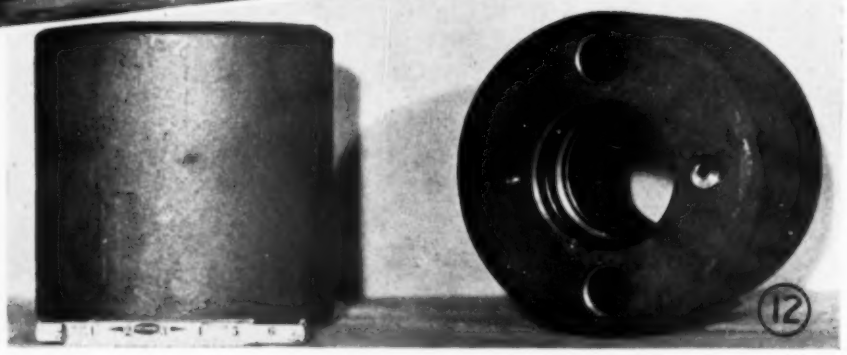


*Fig. 11—One of two displays of malleable iron prepared by the Malleable Founders Society for use in engineering schools. Fig. 12—Pearlitic malleable iron tank track rollers*

# Crucibles NEED CARE

By FRED L. WOLF
Chief, Graphite Section
Mica-Graphite Division
Minerals Bureau
War Production Board
Washington

GRAPHITE is a natural form of carbon and occurs in crystalline and amorphous form. The crystalline form occurs as hexagonal crystals as well as foliated and massive granular forms, and is disseminated through the rocks in which it occurs. It is a lustrous gray to black soft material with a greasy feel. Amorphous graphite is black, somewhat earthy in texture, and also has a greasy feel. Graphite, as carbon, is identical with the diamond and charcoal. It occurs widespread in nature and deposits are found in Ceylon, Madagascar, Greenland, Korea, Mexico, Canada, Brazil, Germany, Soviet Union, and many places in the United States.

The bulk of the natural graphite mined is of the amorphous type, which is not used in the production of graphite crucibles. Crystalline flake graphite is the essential ingredient in manufacturing good clay-graphite and silicon-carbide-graphite crucibles so widely used in melting nonferrous metals and alloys. Previous to 1922 crucible lump and chip graphite from Ceylon were used for the most part in making crucibles. About 1920 Madagascar graphite became commercially available, and gradually eliminated Ceylon graphite in the manufacture of crucibles, resulting in doubled and tripled life.

Specifications for crucible grade graphite call for 85 to 87, preferably not more than 90 per cent carbon. Ninety per cent of the material must remain on a 50-mesh screen (U. S. Sieve Series), and fluxing constituents, such as mica and carbonates, are objectionable, causing a decrease in crucible life.

The United States is one of the largest consumers of natural graphite and produces only a negligible part of its requirements. According to previous surveys on consumption of crucible grade graphite, 65 per cent was employed for crucibles; 25 per cent for stoppers and 10 per cent for miscellaneous uses such as pouring pots, ladle liners, phosphorizers, lubricants, packings, etc. At the present time, due to strategic value and scarcity, the use of high-quality, crucible grade graphite has been curtailed drastically and is employed only in making crucibles.

At the outbreak of the present war a survey indicated that slightly over a 6 months' supply of graphite was available in industry, based on a consumption of 500 tons a month. All stocks were frozen, and on Feb. 23, 1942, Conservation Order M-61 was issued placing the use of crucibles and materials containing Madagascar flake graphite under allocation. A survey was made as soon as the order was issued to determine where the use of crucible grade graphite could be reduced, with the result that heavy flake now is being used only for crucible manufacture, and consumption has been reduced from about 500 to 315 tons per month.

Since January 1943 several additional cargoes have been received and placed in the Metals Reserve Co. (Government) stockpile. By carefully watching the allocations and analyzing each request, the supply stands today at 17 months for crucible grade, and 3 years for stopper grade. Since Madagascar has been freed from enemy control it is expected that this country can look forward to occasional shipments, but until the stockpile position is equal to at least a 2-year supply, every effort must be made to conserve stocks.

When the war broke out the seriousness of the situation relative to securing imports of graphite was realized, and steps were taken to start some domestic development. At present two plants in Alabama and one in Pennsylvania are just getting into production on five grades of graphite. However, the value of this graphite as a substitute for Madagascar graphite cannot be determined until field trials on crucibles with full or partial substitution are completed. One thing that must be kept in mind is that in no way may quality be sacrificed—the domestic grade will have to be considered on the basis of performance and quality only.

According to statistics compiled from the 1943-44 edition of Penton's Foundry List, there are 1506 exclusive nonferrous foundries and 1114 nonferrous foundries operating as departments of other shops. These foundries will require approximately 300,000 graphite crucibles annually. When it is considered that few brass foundries can operate without crucibles, it can be seen plainly how important crucibles are in the nonferrous foundry industry.

Since crucible stock is short, crucibles must be conserved and every possible heat must be squeezed out of each pot. They must be treated properly and given attention and care. A close relationship exists between furnace and crucible, and it takes more than a mere hole in the ground, lined with firebrick and connected to a stack, to make a good pit furnace. By the same token it takes more than a steel shell lined with refractory and any kind of burner to make a good gas or oil-fired furnace.

A good rule to follow in operating a coke-fired furnace is to maintain not less than 3 inches of coke space between crucible and furnace wall, and at least 6 to 10 inches of coke under the crucible. In case of oil and gas-fired furnaces, the space between crucible and furnace wall should be kept to the minimum. Flame never should impinge on the crucible. Provide just a little more space than is necessary to operate the lifting tongs. Also keep the space at the top and bottom of the crucible at a minimum. Insulate furnace walls not only to conserve fuel, but also to shorten the melting time. Keep a record of every crucible used and you (*Please turn to page* 172)

# CONTROLS MANGANESE BRONZE MELTING

By N. K. B. Patch

MANGANESE bronze is an alloy that needs study and experience if sound, reliable castings are to be made. Nevertheless it is relatively simple to standardize production practice so that a quality product results. One of the prime requisites is the control of the melting process so that the composition remains within the limits desired. In melting manganese bronze, it is preferable to start from ingots which have been made by those who understand the production of this bronze. The metal should have been analyzed carefully to insure accuracy to composition or formula. Given a charge of ingot metal that is true to formula, the problem becomes one of control to insure the pouring of molten metal from this charge that is within the desired limits. In other words, no chemical change must be allowed to take place during the melting process. This means that vaporization of any of the ingredients must be kept to a minimum or must be compensated for by adding to the molten bath the necessary metal to replace that which has been vaporized or driven off by oxidation.

This is particularly true of the zinc content, which, at the temperature of molten bronze, vaporizes readily and passes off as a zinc vapor. This vapor becomes zinc oxide when it comes in contact with the heated atmosphere of the furnace. Since this zinc loss is so important, and since the vaporization occurs so easily, it is to be expected that a definite proportion of zinc will be lost when the metal is heated to a certain temperature for a definite period of time. However, adding an estimated amount of zinc is a guess-work proposition. Therefore, it is necessary to devise some method of determining fairly closely how much zinc should be added to replace that lost during melting. The procedure varies in different casting shops.

One method of control that has proved relatively reliable is to cast a thin, flat bar in a cast iron chilled mold, bend and break this bar across its middle and study the fracture. A very satisfactory chill mold is one which makes the bar about 6 inches long, about 1-inch wide at the bottom and about 1-inch deep. The mold is from ¾ to 1-inch thick all around. In pouring the manganese bronze test bar into such a chill mold, the usual practice is to pour a bar only about ¼ to ⅜-inch thick in the bottom of the mold. This will cool quickly, so that it saves time, and the bar then can be put into a vise and bent and broken by striking with a hammer. The amount of bend that the bar stands before breaking is helpful in determining the quality of the bronze in the furnace, as well as the appearance of the fracture.

Pouring test bars of about the same thickness in a chill mold means that they cool at the same rate. Consequently, they are comparable in their structure. It does not take an experienced brass founder very long to learn the difference in the appearance of the structure in the fracture and to recognize the structure which indicates a close approximation to the desired formula as compared with that structure which is at variance.

The high grade manganese bronze compositions that are covered by the government specifications QQB-726b, Classes A, B and C and U. S. Navy Department Spec. 49-B3e when they are true to formula and are sound in structure, will yield in a test coupon, as previously described which has a pinkish satiny fracture. However, if the zinc has been burned out of the alloy, the fracture gradually becomes more and more crystalline as the zinc falls off. Obviously, this procedure means a quick sampling of the melt can be made and a decision arrived at as to how much zinc to add to the melt after which another test specimen is poured and broken. If there has been enough zinc added and the fracture is satisfactory, the metal is withdrawn from the furnace and poured into castings. If, however, too little zinc has been replaced to compensate for the loss during melting, more must be added until the fracture and bend test indicate satisfactory metal is available.

It should be pointed out that this procedure is not scientifically accurate to the extent that carbon tests are accepted in the production of steel; but it is a crude method of quickly determining something that a chemical analysis would tell more accurately but time does not permit an accurate determination.

It further must be pointed out that this method is somewhat crude, it must be performed by those who are sufficiently experienced to be able to do it with a proper background of understanding and full realization of its limitations. Such realization results from the experience that comes with having done it for some time. No manganese bronze will respond to a specific test if it is not true to formula. In other words, one manganese bronze of a given formula will yield definite physical properties when the bars are tested; whereas, another manganese bronze of a different formula (*Please turn to page* 153)

# BRITISH USE GRAY CAST IRON FOR *Trench Mortar Bombs*

CURTAILMENT of certain types of raw materials in Britain has necessitated the adjustment of practices on the part of foundries. For example, foundrymen have been asked to use increasing amounts of native high-phosphorus irons in order to conserve low phosphorus materials, such as hematite (a grade of iron with a lower phosphorus content than the bessemer grade in this country) steel scrap and refined iron.

At the recent annual conference of the Institute of British Foundrymen in London, the Cast Iron Subcommittee of the Technical Committee of the institute, presented a report covering the experience of the iron foundry industry in meeting these changes in the supply of raw materials. This committee is composed of the following: P. A. Russell, convenor, Dr. A. B. Everest, secretary, S. Carter, E. P. Ellis, H. Forrest, G. L. Harbach, Dr. J. E. Hurst, A. Phillips, R. C. Tucker, T. R. Twigger, and H. J. V. Williams.

The following examples in practice have been taken from the report of the subcommittee:

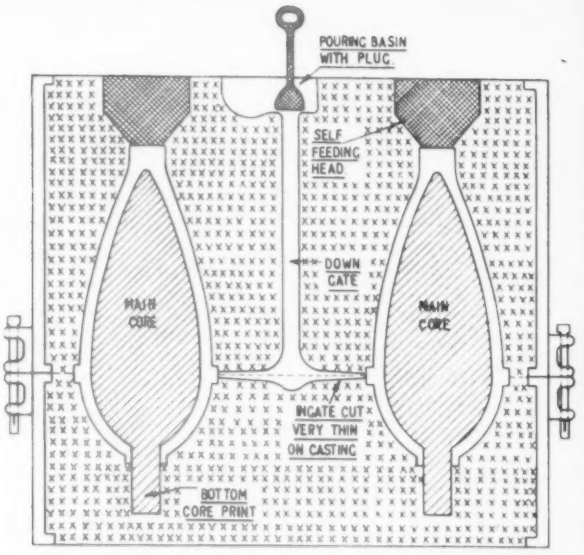
Restrictions in low-phosphorus materials largely have been met by:

(a) Substitution of hematite by low-phosphorus blast furnace pig iron with phosphorus about 0.4 per cent, resulting in general increase in phosphorus. If the proportion of hematite in the charge did not exceed 30 per cent, the resulting increase in phosphorus was only 0.1 per cent, and this rarely caused any difficulty.

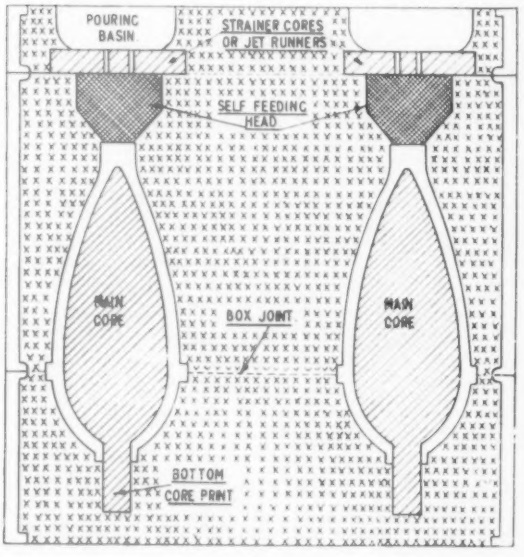
(b) Replacement of hematite by refined pig iron. Low-phosphorus refined pig iron is obtainable at a premium, and it has been possible to maintain castings at the same phosphorus level as before, while at the same time dispensing with the use of a certain amount of steel scrap. The use of very low-phosphorus refined pig iron is discouraged, and a slight increase in phosphorus, as indicated in (a) usually can be tolerated.

(c) By careful control over the metal mixture, and especially over carbon and silicon contents whereby the

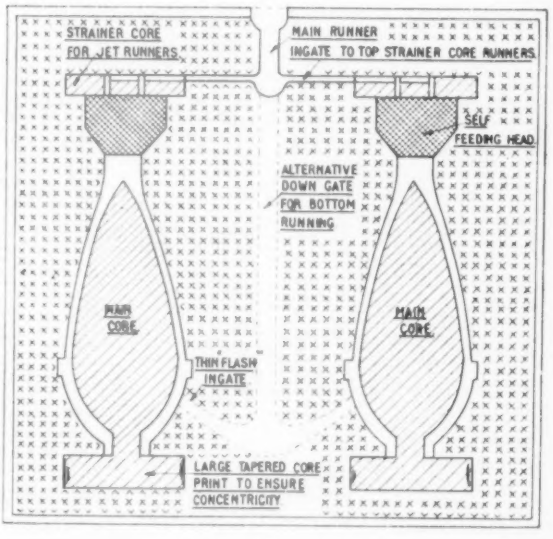
This article is from a report presented at the annual conference of the Institute of British Foundrymen held in London, June 26.



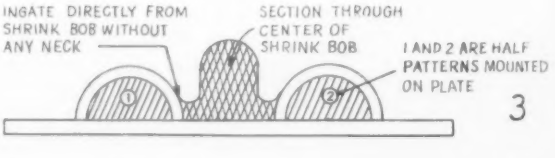

1 (a)




1 (b)


STRAINER CORE FOR JET RUNNERS
MAIN RUNNER INGATE TO TOP STRAINER CORE RUNNERS
SELF FEEDING HEAD
ALTERNATIVE DOWN GATE FOR BOTTOM RUNNING
MAIN CORE
MAIN CORE
THIN FLASH INGATE
LARGE TAPERED CORE PRINT TO ENSURE CONCENTRICITY

2


INGATE DIRECTLY FROM SHRINK BOB WITHOUT ANY NECK
SECTION THROUGH CENTER OF SHRINK BOB
1 AND 2 ARE HALF PATTERNS MOUNTED ON PLATE
1
2

3

*Fig. 1—Methods of casting trench mortar bombs vertically with self-feeding heads. (a) In a 2-part flask with runner on joint. (b) With strainer or pop gates on top. Fig. 2—Diagrammatic sketch of drag half of mold showing core in position with suggestions for top and bottom running with feeder head. Mold is produced from split pattern and turned on end to cast. Fig. 3—Section through two half patterns showing typical shrink bob or blind feeder. Bomb bodies cast on flat and main gate inserted between the shrink bobs for each 4 castings in 2 pairs*

deleterious effects of phosphorus on mechanical properties may be eliminated or counterbalanced. The use of late silicon additions is recommended strongly.

(d) By giving careful attention to improved methods of running and rising, e.g., by the increased use of feeding heads, by the adoption of new running methods incorporating "atmospheric feeding" and special types of feeder gates.

(e) By adopting centrifugal casting methods wherever practicable.

(f) By careful attention to pouring temperature.

(g) By the correct use of deneseners.

In elaboration of these points the following details and examples supplied by members of the subcommittee may be of interest.

Several methods have been used quite successfully for the production of trench mortar bomb body castings in green sand molds, without the use of feeding heads. According to the type of tackle available, these may be cast either vertically with the tail up, vertically with the nose up, or on the flat. In nearly every case, however, this entails the use of cast iron with comparatively low phosphorus content, certainly not over 0.5 per cent.

In order not to exceed this maximum phosphorus content, it is necessary to include a considerable proportion of hematite, refined iron, steel scrap or similar low-phosphorus materials in the mixture. Since only very moderate physical properties are required in this type of casting, methods successfully have been devised to make use of phosphoric iron with a final phosphorus content of 0.9 to 1.2 per cent.

To achieve complete pressure tightness with this type of high-phosphorus composition, the most reliable method is to cast the bomb bodies vertically, with the tail uppermost and with the addition of a suitably designed feeding head on the top of the casting. This feeding head need not be of large proportions, provided it is designed so that it is the last portion of the casting to solidify and thus provides a suitable reservoir of liquid metal to feed the casting proper. The accompanying sketch (Fig. 1a and b) gives details of the design of feeding head most usually adopted.

It is assumed that the molds will be produced in green sand on molding machines or by plate molding. The exact method will depend on the type of tackle available. If it is desired to mold the castings vertically, then the joint will be at the middle of the band in a simple two-part mold. When this method is adopted, it will, of course, be necessary to use loose feeding head patterns in the cope portion of the mold. These will be withdrawn from the top side, leaving open feeding heads. The runner will be located on the joint of the mold, and the actual ingate must be kept as small as possible, in order to prevent any risk of "drawing" from the thicker portion of the gate. This latter tendency can be obviated by the application of jet type runners (popgates) placed directly over the feeding head, but of course this involves the use of an additional top part to carry the jet runners.

When commencing production for the first time in any foundry it would be much more economical to use half patterns mounted on plates complete with feeding heads and runners. The molds then are made on molding machines or by plate molding on the flat, in simple two-part boxes adapted for vertical casting. In order to avoid the risk of swollen castings, or "burst outs", it is a very simple matter to apply loose clamping plates when the boxes are upended for casting. Fig. 2 illustrates this second method.

Where it is absolutely impossible to use feeding heads or cast the bomb bodies vertically, it may be just possible to cast them on the flat in phosphoric cast iron, by making use of the well-known practice adopted by malleable iron foundries by the pro- (*Please turn to page* 183)

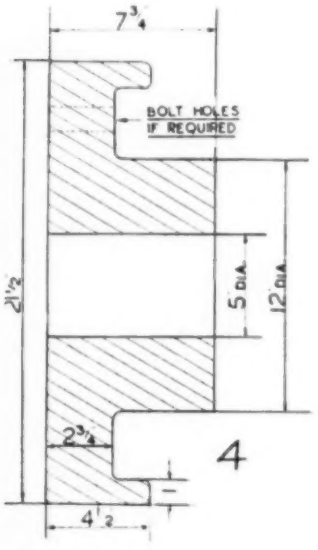
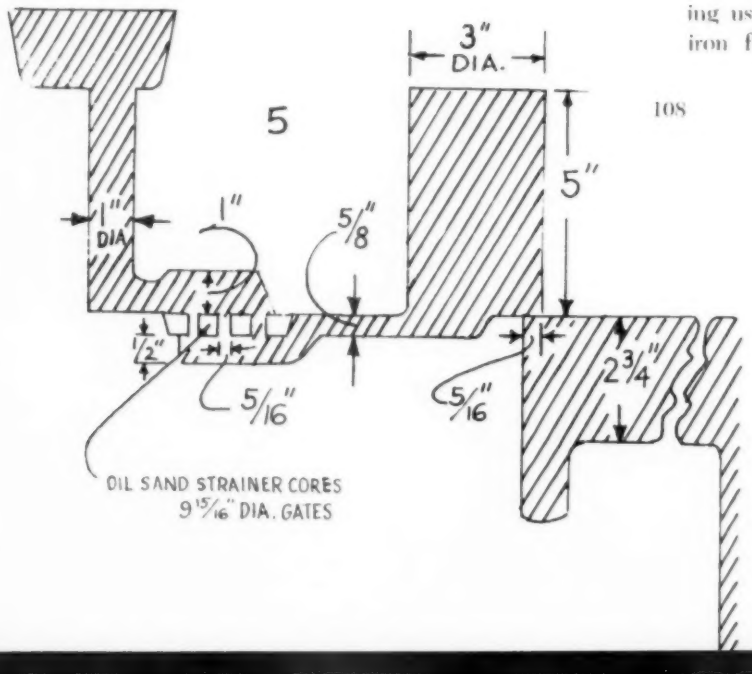
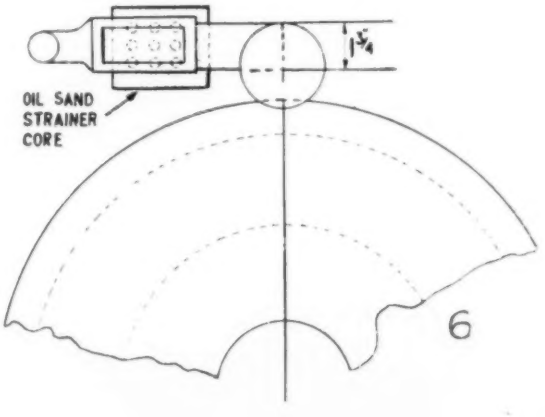



*Fig. 4—Section of a typical coupling with dimensions. Fig. 5—Method of running coupling showing cross section through runner-riser and part section of coupling casting. Fig. 6—Plan showing runner as in Fig. 5*



# *Using Aluminum*
# CASTING ALLOYS EFFICIENTLY

DUE to heavy requirement for aluminum and its alloys, Conservation Order M-1-i was issued by the War Production Board to restrict their use to certain specified essential applications. The WPB now points out that providing for these essential requirements, requires the intelligent use of all the material comprising the supply. Remelted scrap ingot not only forms a significant part of the aluminum supply but already contains many of the critical alloying elements needed. By using these materials effectively, the end of the year may see most, if not all, of the essential war service requirements for aluminum filled for (*Please turn to page* 182)

## Approximate Equivalent Specifications for Casting Alloys

| Commercial | Fed'l | Army Ord. | Sand Castings Navy | Aeronautical | S.A.E. | A.S.T.M. |
|---|---|---|---|---|---|---|
| Specification | QQ-A-601 & E-QQ-A-601 | AXS 784 | 46-A-1 (Int.) (5 1/42) | Number | Number | B 26-42 T |
| Alloy | Class | Class | Class | | | Alloy |
| 220 | | | | AN-QQ-A-392-2 | 324 | |
| 356 | 3 | | 3 | AN-QQ-A-394-2 | 323 | SG1 |
| 214 | 5 | | 5 | AN-QQ-A-402-2 | 320 | G1 |
| 142 | 6 | | | AN-QQ-A-379-2 | 39 | CN21 |
| 355 | 10 | | | AN-QQ-A-376-2 | 322 | SC21 |
| 195 | 4 | | 4 | AN-QQ-A-390-2 | 38 | C1 |
| 43 | 2 | | 2 | AN-QQ-A-405-3 | 35 | S2 |
| 40E | | | 1 | | | ZG41 |
| Sec. 355* | | | | | | |
| Sec. 195 | 13 | 13 | 4a | AN-A-5 | E-325 | C2 |
| X113-A334* | 14 | 14 | | AN-A-4 | E-326 | |
| 108 | 8 | | | AN-QQ-A-397-2 | | |
| 212 | 9 | | | AN-QQ-A-399-2 | 36 | CS21 |
| 112 | | 13 | | | 33 | |
| 12 | | 15 | | | 33 | CS22 |

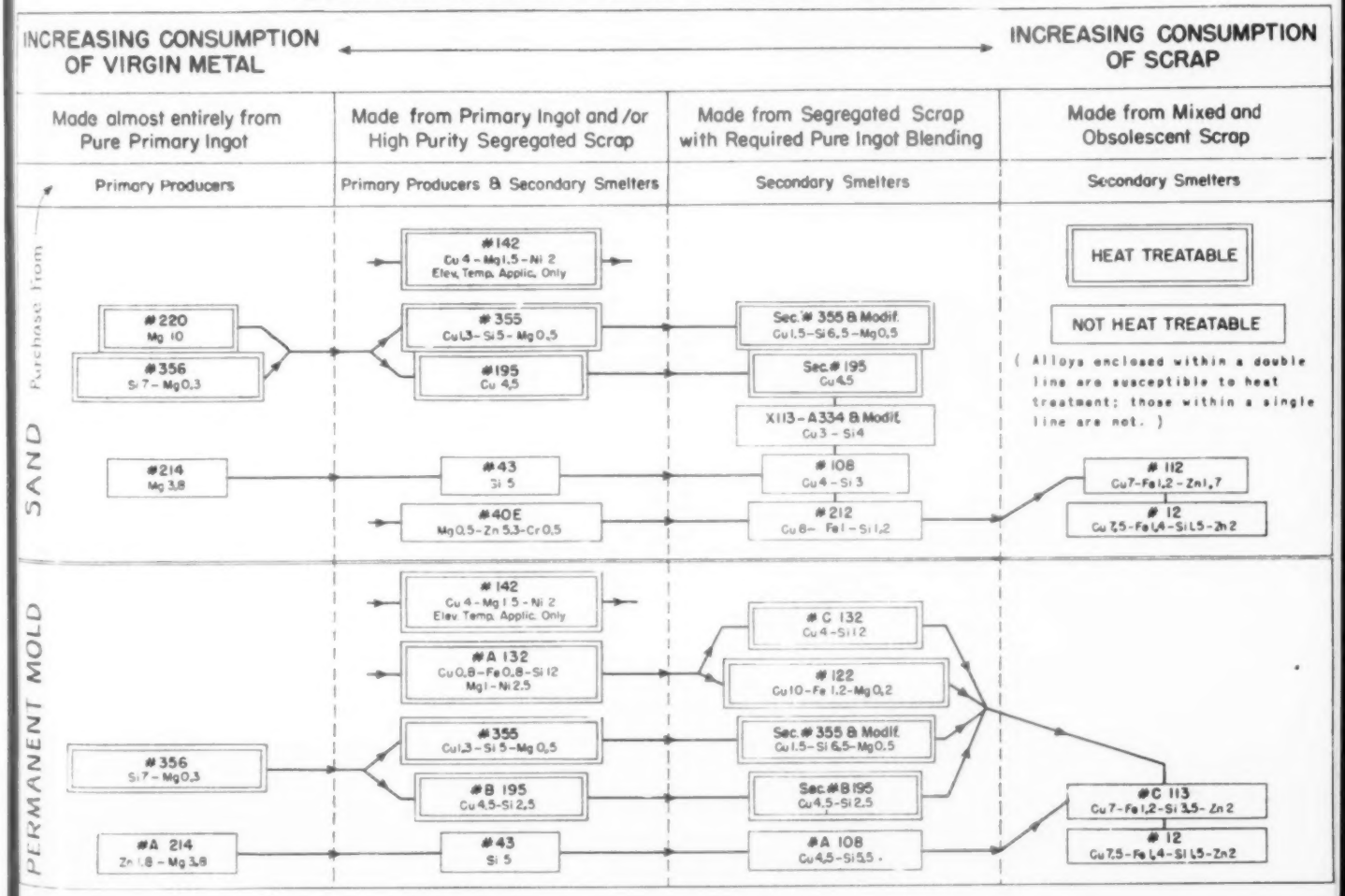
*And Modifications

| Commercial | Fed'l | Permanent Mold Castings Army Ord. | Navy | Aeronautical | S.A.E. | A.S.T.M. |
|---|---|---|---|---|---|---|
| Specification | QQ-A-596 | | 46-A-15 (Int) (2 1/42) | Number | Number | B 108-41T |
| Alloy | Class | | Class | | | Alloy |
| 356 | 8 | | 8 | | 323 | SG1 |
| A214 | | | | | | |
| 142 | 3 | | 3 | AN-QQ-A-379-2 | 39 | CN21 |
| A132 | 9 | | 9 | AN-QQ-A-386-2 | 321 | SN41 |
| 355 | 6 | | | AN-QQ-A-376-2 | 322 | |
| B195 | 4 | | | AN-QQ-A-383-2 | 380 | CS4 |
| 43 | 7 | | 7 | | 35 | S2 |
| C132 | | | | | | |
| 122 | 2 | | 2 | | 34 | CG1 |
| Sec. 355* | | | 6 | | | |
| Sec. B195 | | | 4 | | | |
| A108 | 5 | | 5 | | | SC1 |
| C113 | 1 | | 1 | | 33 | C3 |

*And Modifications



## ALUMINUM CASTING ALLOYS SUBSTITUTION CHART


INCREASING CONSUMPTION OF VIRGIN METAL
INCREASING CONSUMPTION OF SCRAP
Made almost entirely from Pure Primary Ingot
Made from Primary Ingot and /or High Purity Segregated Scrap
Made from Segregated Scrap with Required Pure Ingot Blending
Made from Mixed and Obsolescent Scrap
Primary Producers
Primary Producers & Secondary Smelters
Secondary Smelters
Secondary Smelters
Purchase from
SAND
PERMANENT MOLD
#142 Cu 4 - Mg 1.5 - Ni 2 Elev. Temp. Applic. Only
#220 Mg 10
#356 Si 7 - Mg 0.3
#355 Cu 1.3 - Si 5 - Mg 0.5
#195 Cu 4.5
#214 Mg 3.8
#43 Si 5
#40E Mg 0.5 - Zn 5.3 - Cr 0.5
Sec. #355 & Modif. Cu 1.5 - Si 6.5 - Mg 0.5
Sec. #195 Cu 4.5
X113 - A334 & Modif. Cu 3 - Si 4
#108 Cu 4 - Si 3
#212 Cu 8 - Fe 1 - Si 1.2
HEAT TREATABLE
NOT HEAT TREATABLE
( Alloys enclosed within a double line are susceptible to heat treatment; those within a single line are not. )
#112 Cu 7 - Fe 1.2 - Zn 1.7
#12 Cu 2.5 - Fe 1.4 - Si 1.5 - Zn 2
#142 Cu 4 - Mg 1.5 - Ni 2 Elev. Temp. Applic. Only
#A 132 Cu 0.8 - Fe 0.8 - Si 12 Mg 1 - Ni 2.5
#C 132 Cu 4 - Si 12
#122 Cu 10 - Fe 1.2 - Mg 0.2
#356 Si 7 - Mg 0.3
#355 Cu 1.3 - Si 5 - Mg 0.5
#B 195 Cu 4.5 - Si 2.5
Sec. #355 & Modif. Cu 1.5 - Si 6.5 - Mg 0.5
Sec. #B 195 Cu 4.5 - Si 2.5
#C 113 Cu 7 - Fe 1.2 - Si 3.5 - Zn 2
#12 Cu 7.5 - Fe 1.4 - Si 1.5 - Zn 2
#A 214 Zn 1.8 - Mg 3.8
#43 Si 5
#A 108 Cu 4.5 - Si 5.5 -

## Limit Number of Castings To Those Indicated in Order

Q.—In the operation of our nonferrous foundry we increase the size of an order by a safety factor to insure having sufficient pieces. Where the number of defective castings does not measure up to expectations, we are faced with the problem of what to do with the extra castings. The left over castings on any one order may not represent a great amount of metal, but in the aggregate taken over a considerable period the idle metal may be measured in tons. Is it customary to go to the trouble of calculating the cost of storage, entering the items in the record, interest on investment, rent, etc., to determine if storage for any length of time is economically justified?

A.—Under present emergency war conditions, scarcity of materials and necessity of utilizing every pound of metal to the fullest extent, the problem of handling extra castings practically is reduced to two alternatives. Either persuade the customer to take the extra castings, or throw them into the pot day to day. In many, perhaps in the majority of instances, it is possible to make the exact number of castings required to fill an order. If a few of the castings are defective, they can be replaced the following day, or from a subsequent heat the same day. The custom of making extra castings came into being during the lean days when metal was plentiful, customers were scarce, competition was high and the foundryman was at his wit's end to keep his head above water. These conditions no longer exist. If a little expert salesmanship will not dispose of your accumulation of extra castings, you will save money, book keeping expense and headaches by regarding them as dead pigeons to be thrown into your scrap bins and added as component parts to your current daily furnace charges. Insurance is a commendable and essential factor in the conduct of any business, but it can be carried to a point where it becomes top heavy enough to defeat its own object.

## Suggests Use of Plaster Molds For Smooth Surface

Q.—We are interested in obtaining a smooth casting in sand. We repair a large volume of silverware, and regularly have to make such parts as legs, knobs, handles, spouts, etc. We have been making those in plastic molds, but have switched to sand. We are anxious to get sand that will make smoother castings in brittania metal, and would like to use it for making brass castings.

A.—The fact that you are doing repair work indicates that you do not have to make many castings from a given pattern, and therefore it becomes more a question of smoothness to save labor on finishing than of saving labor on molding. Consequently, the method which will produce the smoothest casting nearest to the desired design, even though it does require extra molding time, usually will be the cheapest in the long run.

In our opinion the plaster of paris mold will yield the best finished casting if the mold is made properly, and probably would be the most economical in the long run. No doubt you have found that plaster molds must be hot enough to be relatively free from moisture when the casting is poured. If the molds are taken from the oven at a temperature of 150 to 225 degrees Fahr., you can pour brass into them as well as brittania metal, and obtain castings which are finished highly and accurate to pattern. Preparation of plaster molds is much more expensive than for sand molds, but labor on the castings thereafter is much less.

For highly finished castings such as statuary, French molding sand was used, but that material no longer is available. One procedure for producing fine sand for highly finished work is to dry thoroughly some Albany sand. Then sift it through fine sieves, rubbing it on the sieve if necessary so the individual grains will pass through. By taking some of that fine sand and mixing it with the proper amount of bond or moisture a facing sand can be provided which may be spread on the pattern to form the surface of the mold.

Some find that making such a facing sand from finely sifted sand plus molasses water or other bond gives a mold that meets requirements, but others prefer to use a thin solution of fireclay and water or dextrose and water. It should be borne in mind that molds made with such facing must be dried thoroughly to evaporate the moisture from the surface so that the molten metal will lie quietly.

## Small Amount of Steel Can Be Used for Light Castings

Q.—We have an order for castings 4 x 4 inches, 2 feet in length with a metal thickness between ¼ and ⅜-inch, weight about 57 pounds. The customer specifies "semi-steel," but does not specify analysis or physical test of any kind. We operate a general jobbing foundry on light and medium weight gray iron castings in which our usual iron is quite satisfactory. Will it be necessary to make up a special charge for the castings referred to, or can we mix some steel turnings in a ladle of our regular metal? So far as we know, high strength is not a requisite.

A.—Steel scrap as you undoubtedly know, is added to the

cupola charge to reduce the carbon content and thereby improve the structure, and consequently the physical properties of the resulting castings. The amount of steel may vary from 5 to 90 per cent depending upon the properties desired in the casting, and the section thickness. Also you probably know that the term semisteel is a misnomer, since steel scrap melted in a cupola becomes gray iron or white iron depending upon the silicon content, and whether or not the scrap forms all the charge or only part of it.

Presumably your customer is not aware of that fact, and our suggestion is to get in touch with him and find out reasons for specifying semisteel. You can point out to him that unless some special requirement is involved, that your usual iron will serve satisfactorily in the castings. However, if he insists on use of steel scrap, then you will have to meet his demands.

You cannot follow your plan of adding some steel turnings to a ladle of iron since the possibilities of not dissolving all the turnings, or of reducing the temperature to a point where the ladle cannot be poured, are too great. We believe that the substitution of 5 or 10 per cent steel for an equal amount of cast scrap in your first regular charge will serve for pouring those castings, and the remainder of the iron can be poured into any other molds on the floor. The small amount of steel in the charge will not affect the metal to any material extent.

Sell your customer the idea that your recommendation of a suitable iron based on long experience will better meet the casting requirements than some mixture whose virtue is only hearsay.

## Place Heavy Slugs in Mold To Cool Rim of Fly Wheel

Q.—We are enclosing sketch of two fly wheels of somewhat unusual design which we have been asked to make. On account of the thin web and heavy rim we are inclined to the opinion that even if they do not crack in the foundry, they may crack in service. Even if we cooled the rim as fast as possible there would still be internal shrinkage strain. We propose using iron with a 2.75 per cent silicon content. We shall appreciate your opinion on whether this particular job falls within the range of practical foundry accomplishment.

A.—For a wheel molded and cast in the usual manner the answer is "no." The web would crack before the wheel would be cool enough to be lifted out of the sand. It is just another example of faulty designing by some person without any knowledge of the natural and inexorable laws governing the behavior of metal while passing through the stages from liquid to solid. If you can persuade the customer to agree to the only conditions under which you will undertake to make the casting, two suggestions are offered for your consideration: (1) Make a new pattern so that you can cast the rim and web separately. They can be machined and bolted together. The customer may refuse on account of the added expense. The second suggestion is to work from the present pattern, provided you have the customer's permission to adopt any remedial measures you may consider necessary to produce a casting that will meet his requirements. The remedy in this particular instance is to borrow a leaf from the steel foundryman's bag of tricks and place a number of internal chills in the rim part of the mold. These chill blocks will cool the metal in the rim rapidly and promote fairly uniform shrinkage and contraction over the entire casting.

To promote cooling further it may be advisable to enclose the outer face of the wheel in a ring of cast iron slabs 1 inch thick, 3 inches wide and 14 inches in height. These are rammed up with the drag and the extra 1½ inches on the lower end is to hold them in place when the wheel pattern is removed from the mold. In addition to cooling the casting these external chills will densify the metal on the face of the wheel where it is to be machined and polished. Suggested number of chill blocks for the larger wheel is twelve 4 x 6 x 13 inches. That will provide an average thickness space of 3 inches around each block for the molten metal. The blocks of course should be perfectly clean and dry and sprayed with a thin coating of any kind of oil before they are placed in the mold. They are provided with teats top and bottom to hold them in place on the drag and against the cope.

With the pattern suitably marked, small pieces of plate are set in place to serve as resting places for the teats on the chill blocks. Where these little projecting members are tapered to about ¼-inch diameter, they will hardly show on the finished casting. No other chaplets are necessary, since the weight of the blocks is almost sufficient to hold them in place when surrounded by molten metal. A silicon content of 2.75 per cent is too high for these castings. The grain will be too open to secure a nice polished face on the thick rim. Silicon 2.00 to 2.25 per cent and manganese 0.70 per cent will serve more satisfactorily. The casting may be gated on the hub in the usual manner, or it may be gated satisfactorily, as you suggest, through a number of pop gates on the web.

## GANGWAY!

By J. A. Patterson

**"Oh, I'll admit we need him and he's a good worker—but will he fit in with the other employes?"**

## Size of Charge for Small Cupola

Q.—What is the proper blast pressure and volume for a cupola 22 inches inside diameter? We also shall appreciate information on the type of blast gage, fluxing material, coke size, and weight of charges.

A.—For a 22-inch inside diameter cupola, capable of melting approximately 3500 pounds per hour, the blowing equipment will include a 5-horsepower motor and a fan to deliver about 800 cubic feet of air per minute at a pressure of 8 ounces. Diameter of the fan outlet and blast pipe is 7 inches. Pressure is only incidental. Blast volume is the important factor. Many materials may be used as a flux, but the usual material is limestone broken to 1-inch or smaller size.

For a 22-inch cupola the coke size is approximately 2 inches. The coke bed should extend about 36 inches above the tuyeres at the time charging commences and that means after the coke has burned through and has settled. Weight of the coke and iron charges may vary to some extent depending on the character of the coke and the size of the pieces of pig iron and scrap. A little experimenting will be necessary to determine this point. A safe beginning will be with 30 pounds coke and 250 pounds iron with 10 pounds limestone on each coke charge. If the cupola is in blast for over an hour, the slag will have to be removed either constantly, or at intervals through a suitable slag hole either at the back of the cupola or through a skimming spout at the front. For a complete treatise on cupola construction and operation we suggest a study of *Melting Iron in The Cupola*, 240 pages, 126 illustrations, by J. E. Hurst, published by the Penton Publishing Co., Cleveland.

## Metal Not Cause of Casting Cracks

Q.—We are making 4 to 5½-inch angle valves from a mixture of 80 per cent copper ingot and 16 per cent P.M.G. ingot, with addition of 4 per cent zinc and ¼-pound phosphor copper per 100 pounds metal. The alloy is poured at a temperature of 2000 degrees Fahr. The molds are dry sand and the cores contain 22 parts Albany sand, 10 parts beach sand and 1½ parts raw linseed oil. The cores while green are sprayed with molasses water and oil. We have tried several styles of gates and risers, but the castings crack on the cope side either inside or outside the comparatively heavy valve seat ring.

A.—P.M.G. metal is a silicon bronze originally developed to take the place of tin bronze. In the present instance the metal is not responsible for the cracks. The gate also may be eliminated from the list of possible causes. Any type of gate that will deliver the metal in sufficient volume and speed to fill the mold properly may be used. The main cause of the cracks is a hard core which does not allow the metal to contract normally. The second probable cause is the risers in a rigid mold.

Risers are necessary to feed the flanges and the heavy valve seat, but they should be free to move as the casting contracts. If they are close to a flask bar, a piece of shingle or thin board should be rammed next to the bar on the riser side. This piece is removed before the mold is placed in the oven. Later the cavity is left open or filled with loose sand. However, it is not necessary to dry these molds. Green sand molds, made with proper care will serve satisfactorily. Green sand yields to casting contraction more readily than hard dry sand. With the high proportion of molding sand in the present core sand mixture, the amount of oil binder is too high. Spraying the cores with molasses water and then with oil produces a beautiful hard, smooth core, but is no more necessary than a piano finish on a one-off pattern. Cut the binder by about one-half and omit the spray. A better plan all around is to use green sand cores, or dry sand bottom halves with green sand tops.

## Manganese Bronze Requires Care

Q.—We have experienced trouble in making manganese bronze castings from ingot metal conforming to Navy specification 49-B-3. First run castings were brittle and showed a definite granular structure similar to soft gray iron. Chemical analysis of ingot metal showed proper composition so we assumed it was not alloyed correctly, and proceeded to flare the metal after it had been melted; pouring a small bar every 3 minutes, cooling and bending the bar. Flaring was continued until a bar could be bent without breaking. In some cases it was necessary to flare for 20 minutes with a loss of as much as 16 pounds of zinc.

A.—Your description of the practice employed in melting and pouring manganese bronze made from ingot leads us to the opinion that you are not getting a proper control of zinc content. To have manganese bronze meet the physical requirements under test the chemical combination of elements must be maintained as closely to formula as possible. If the ingot purchased meets the standard specification, you should get test bars which will show physical properties in accord with the particular composition, unless melting has had deleterious effect. Usual result of extended melting time is to burn out an excessive amount of zinc, and that must be made up by addition of slab zinc.

The flaring process you describe is not entirely clear, and our interpretation is that you continue to heat the alloy until you obtain bars which are ductile. During that time you are reducing the zinc content to the detriment of the metal. When the fracture shows a granular coarse structure with a somewhat bright crystalline appearance, the chances are that the zinc content is dangerously low. True fracture when the test bar is cast in a chill mold as described later, has a fine, satiny, pink appearance. Proper control for zinc content in the shop is checking the fracture of a standard bar say 4 or 5 inches long and ⅜ to ½-inch thick made in an iron mold about 1 inch thick all around. Such a mold cools the metal quickly so that time lag is kept at a minimum. The bar is bent and broken to show the structure, and those bars taken at various times during the heat will indicate the changes in structure due to zinc loss as melting proceeds. A little study of and experience with the fractures soon will educate a competent foundryman to recognize the type of fracture that is consistent with the true proportion of zinc to other ingredients in the manganese bronze.

Best procedure is to make some standard bars from a melt of all new ingot which meets the standard composition requirements. Melting should be done carefully so that the metal comes up to temperature as rapidly as possible. Usual indication is appearance of a light flare which is around 1850 degrees Fahr. for low tensile bronze, and 1950 degrees for high tensile bronze. However, the metal can be poured without bringing it up to the flare point—with some sacrifice of casting properties. Usually 1½ pounds of zinc per 100 is lost and should be replaced.

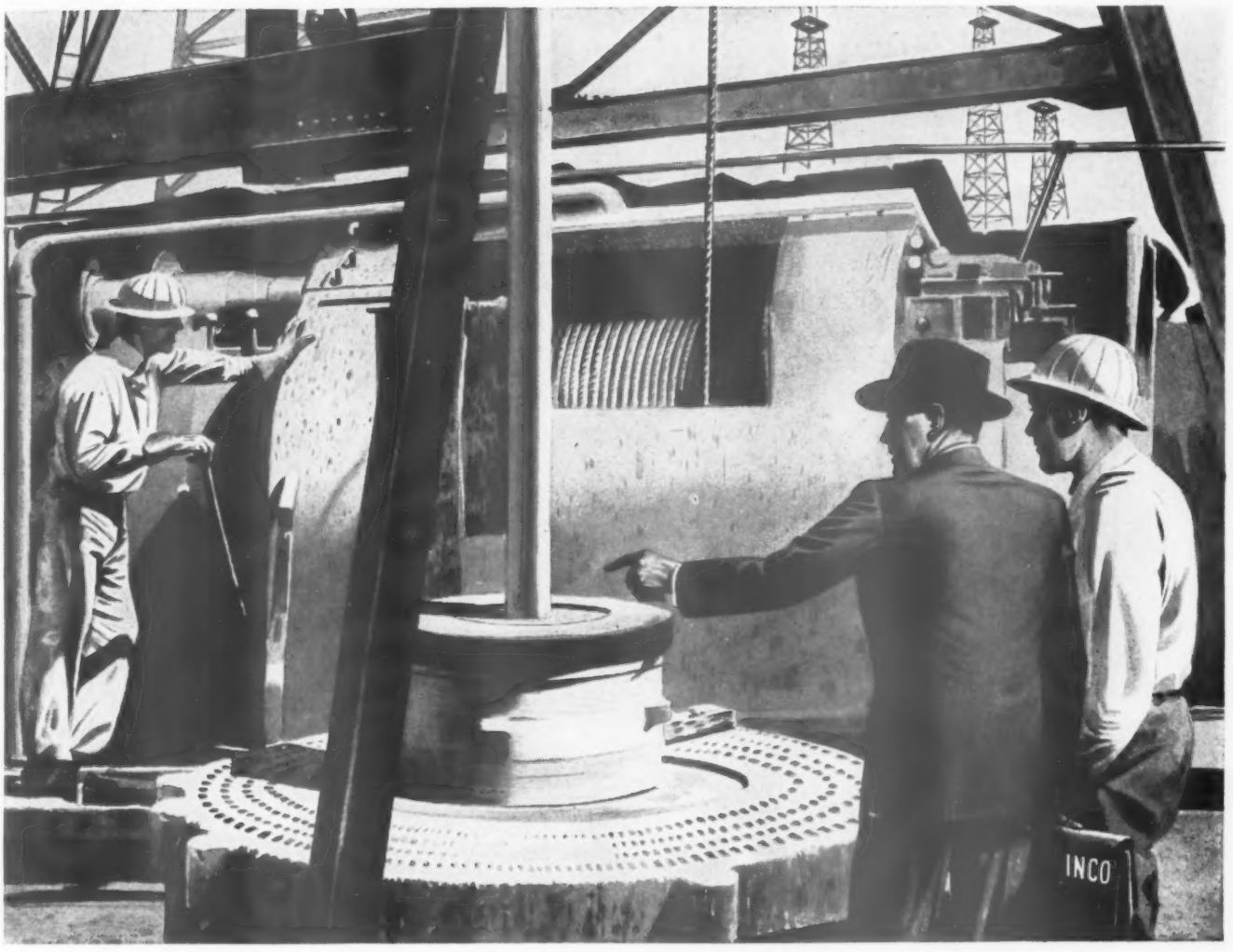
It must be kept in mind that when the alloy is made up of ingot and scrap that the zinc content may be low, unless the scrap is from properly made bronze, that is to say that just before pouring the correct zinc additions were made. Also there is a wide variation in the zinc loss in different heats of metal unless careful control is practiced, that it sometimes is difficult to get bars which will meet physical specifications when large amounts of scrap are used. Therefore, study the fractures of bars from heats meeting specifications both as to composition and physical properties, and perfect your melting practice so that the fractures always are comparable.

## Wants To Estimate Weight of Chill

Q.—Is there any rule for estimating the proper weight of the cast iron chill employed in making a chilled casting? Many years ago we saw an article on this subject with special reference to rolls and car wheels. Would the same rules apply for example to the chill on a flat plate 18 x 30 inches and 4 inches thick? This chill forms the drag face of the casting.

A.—Different thicknesses of chills are required for different diameter rolls. The usual rule is to allow ⅜-inch thickness in the chill for each inch of roll diameter. For example a 14-inch diameter roll would require a chill 5¼-inches thick and a 30-inch diameter roll would require a chill 11¼ inches in thickness. This thick body of iron is not for the

(*Concluded on page* 114)




## NICKEL AIDS THE PETROLEUM INDUSTRY

# *to KEEP 'EM PRODUCING!*

Oil is ammunition. On every battle front, oil is war material number one.

Besides power for ships and subs, planes and tanks, trucks and jeeps, it also provides the basic ingredients for synthetic rubber, toluene for TNT, chemicals, and many other essential war materials.

To meet increased wartime demands for oil, field and pipeline equipment carries heavier loads. Refineries make longer runs at high heats and pressures. Engineers add sub-zero cycles and new catalysts. Equipment is taxed up to and sometimes beyond rated capacity . . . precision equipment that cannot be readily replaced.

Despite emergency schedules, however, that equipment rarely fails. For, since the days when shallow wells were drilled with wooden rigs and kerosene was shipped in oak barrels, oil men have relied largely on stressed parts strengthened and toughened by additions of Nickel.

The oil industry knows many uses for Nickel alloyed materials, from crown blocks to drill bits, from sucker rods to pressure stills. Alone, or in combination with other alloying elements, Nickel helps metals resist corrosion, retard wear and absorb shock overloads. Properly used, a little Nickel goes a long way to insure dependable, uninterrupted operation of production and refining units.

For years the technical staff of International Nickel has been privileged to cooperate with petroleum engineers whose pooled information and "know-how" are now so vital to Victory. To men in all industries who desire assistance in the selection, fabrication and heat treatment of ferrous and non-ferrous metals, INCO engineers and metallurgists offer counsel and data.

### New Catalog Index

New Catalog C makes it easy for you to get Nickel literature. It gives you capsule synopses of booklets and bulletins on a wide variety of subjects — from industrial applications to metallurgical data and working instructions. Why not send for your copy of Catalog C today?

* *Nickel* *

**THE INTERNATIONAL NICKEL COMPANY, INC.,** *67 Wall St., New York 5, N. Y.*

(*Concluded from page 112*)

purpose of resisting the static pressure—rolls are cast in a vertical position—but to produce a deep chill on the outside of the roll, and also to prevent the chill from cracking when suddenly heated. For this reason the rule is modified for the smaller and larger sizes of rolls. Thus the minimum thickness of a chiller for a 4-inch roll should not be less than 2 inches. The accompanying table shows roll diameter and thickness of chill for rolls between 4 and 30 inches.

| Roll Dia. In. | Chill Thick. In. | Roll Dia. In. | Chill Thick. In. |
|---|---|---|---|
| 4 | 2 | 18 | 6¾ |
| 5 | 2½ | 19 | 7⅛ |
| 6 | 3 | 20 | 7½ |
| 7 | 3⅛ | 21 | 7⅞ |
| 8 | 3¼ | 22 | 8¼ |
| 9 | 3⅜ | 23 | 8⅝ |
| 10 | 3¾ | 24 | 9 |
| 11 | 4⅛ | 25 | 9⅜ |
| 12 | 4½ | 26 | 9¾ |
| 13 | 4⅞ | 27 | 10⅛ |
| 14 | 5¼ | 28 | 10½ |
| 15 | 5⅝ | 29 | 10⅞ |
| 16 | 6 | 30 | 11¼ |
| 17 | 6⅜ | | |

For plates and other similar castings the usual rule of thumb foundry method is to make the chill the same thickness as the casting . In designing a chill, several factors must be considered including composition of iron in the casting, depth of chill required on the casting face and composition of the metal in the chiller. The thicker the chill, within reasonable limits the deeper will be the resulting chill on the casting. Obviously a thin chiller will not last as long as a thick chiller.

Only through long practical experience can the foundryman decide between the minimum and maximum thickness required in a chill for any definite purpose. The chilled iron car wheel presents an extreme example of this feature. The rim of the wheel is approximately 1½ inches thick. Theoretically a chiller ½-inch in thickness should function satisfactorily. Practical wheel makers know that a chiller ½-inch thick would break the first time it was used. Therefore, the chills in use are approximately 4½ inches in thickness. No relationship can be established on a weight basis between casting and chiller.

## Casting Bronze in Metal Molds

**Q.**—We are interested in casting bronze in permanent molds. Is the process limited to certain types of castings, alloys and pouring temperatures. Is there any book on the subject?

**A.**—So far as we know there is no book on the subject of permanent mold casting practices, but from time to time some mention is made in the literature. In general it might be said that the only limitation of permanent mold use is the intricacy of the casting. Essentially use of permanent molds is confined to large production runs where the cost of the mold and its engineering charged off to each casting will be a small item. Again, the final cost of the permanent mold casting must be equal to or preferably less than a sand casting unless the former procedure provides advantages such as lower machining cost due to casting being closer to size, higher physical properties, etc.

Designing permanent molds is an art that is acquired by experience, and involves considerable experimental work for satisfactory results. The mold must be of such thickness that it can be used over and over again at short intervals without becoming too hot, fire-cracking, or warping. If the mold is too thin, it may crack after a short run or get too hot so that the castings take a long time to solidify. If the mold is too thick, it may chill the castings too much, or cause difficulty through cold shuts.

## Has Trouble With High Sulphur

**Q.**—We make light and medium weight machinery castings up to 5000 pounds each. Our cupola is lined to 42 inches at the tuyeres which are 4 inches high and 16 inches above the bottom. We melt 10 to 12 tons per day in 1 to 1¼ hours using beehive coke. Charges are composed of 25 per cent pig iron containing 2.13 per cent silicon and 1.13 per cent manganese; 25 per cent pig containing 2.38 per cent silicon and 0.88 per cent manganese; 35 per cent home scrap, and 15 per cent purchased cupola scrap. First charge is 1000 pounds including 150 pounds rail steel. Other charges are 2000 pounds with 320-pound coke splits. Bed height is 42 inches. Recent analysis of iron showed 1.68 per cent silicon; 0.43 per cent manganese; 0.196 per cent sulphur; combined carbon 1.20 per cent, and graphitic carbon 2.09 per cent. We have had numerous complaints about the high sulphur. How can we improve the quality of our castings?

**A.**—As indicated by the analysis you give, some of the iron must be of mottled fracture and hence, hard to machine. The manganese content is not as high as it should be to inhibit the high sulphur content. Your melting rate of 10 to 12 tons seems to be rather high for a 42-inch cupola, and as may be seen from the following you are losing about half of the manganese supplied by the pig and purchased scrap: 250 pounds of the 1.13 per cent manganese pig supplies 2.83 pounds manganese; 250 pounds of the 0.88 per cent manganese pig supplies 2.20 pounds manganese, and 150 pounds purchased scrap (0.60 per cent manganese average) supplies 0.90 pounds manganese or a total of 5.93 pounds of manganese in 650 pounds of iron giving an average of 0.91 per cent. With reasonable cupola practice you should lose only 20 to 25 per cent, leaving a final manganese content of 0.69 per cent in the iron over the spout.

You mention 320-pound coke splits which seem rather excessive, and presumably are using a high blast to obtain the melting rate you are getting. Possibly the coke is high in sulphur also. The distance of the tuyeres from the sand bottom appears somewhat high unless it is necessary to hold a considerable amount of metal in the cupola well. The longer the iron remains in contact with the coke, the greater the pick-up of carbon and sulphur, and hence, it is advisable to keep the tuyeres at the lowest possible point. Sulphur content in the iron can be reduced to an appreciable degree by use of fused soda ash in the mixing ladle.

One point which is not quite clear is the bed height you are using. It is mentioned as 42 inches, but no indication is given as to whether that is the total height from the sand bottom, or if it is the distance the bed extends above the tops of the tuyeres. If it is the former, your bed is much too low since you actually only have 22 inches of coke above the tuyeres. Minimum distance above the tuyeres should be 30 inches. One way to determine the proper height is to locate the melting zone which is that portion of the lining which burns out, and take the lower edge of that as the minimum height for the bed. Then place a coke split on that for melting the first charge of iron.

## May Use Hard Iron For Cast Bells

**Q.**—What other metal composition other than copper and tin can be used for making locomotive bells?

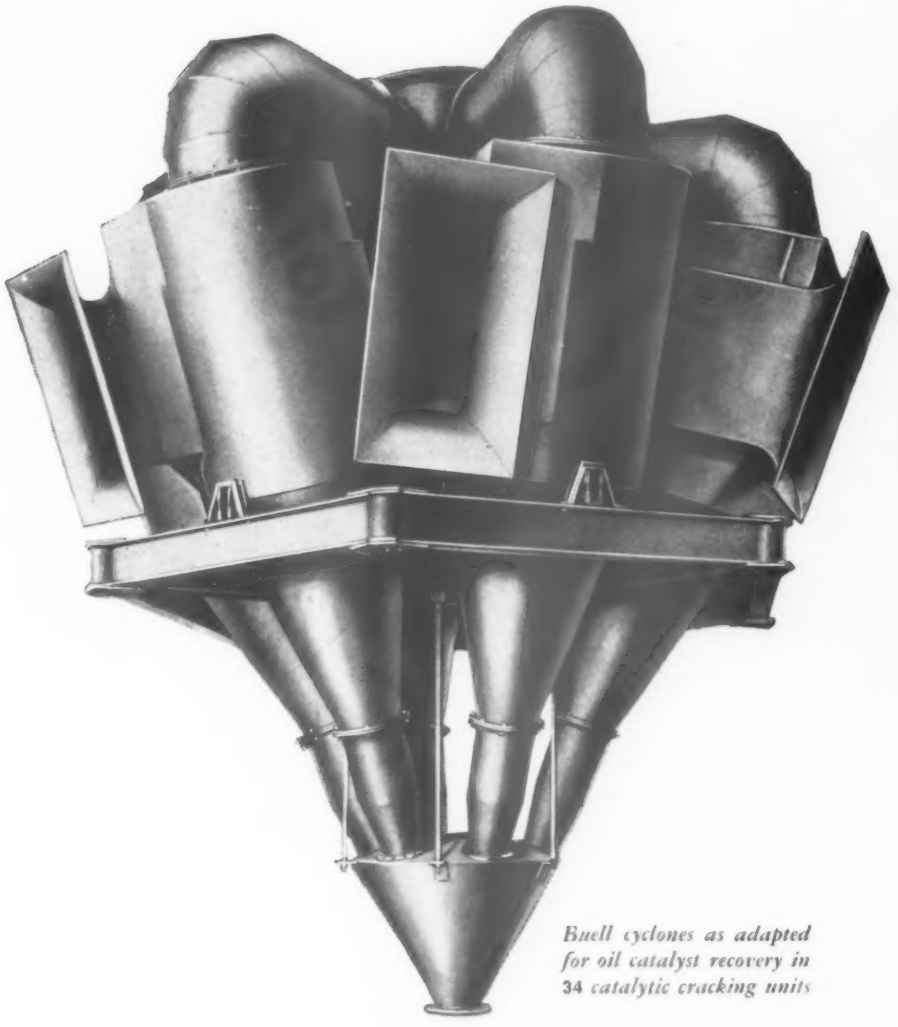
**A.**—Since copper and tin no longer are available you probably will have to use cast iron or steel. These metals are not as resonant or melodious as bronze, but for purely utilitarian use as locomotive bells they should prove quite satisfactory. They have been used for that purpose already. Many years ago cast iron bells were quite common, cow bells, church bells and school bells.

A gray iron foundry in Ohio has been making iron bells for many years. Several months ago the Navy Department sent out an inquiry for cast iron ship bells. If the Navy with its traditionally rigid specifications is willing to try out cast iron as bell material under present national emergency conditions, other users should have no hesitation in accepting the same metal. Clearness and resonance of bell tone depend on the composition of the metal and the thickness of the bell wall. The metal should be what is termed in the foundry *hard iron*. Thus for a locomotive bell, average thickness ¾-inch, a suitable iron will conform approximately to the analysis of car wheel iron: Total carbon 3.25 per cent, combined carbon 0.85 per cent, silicon 0.75 per cent, manganese 0.75 per cent, sulphur 0.10 per cent, phosphorus 0.40 per cent.

Incidentally it may be of interest to know that instead of rapping his gavel on the table, the presiding officer of the Northeastern Ohio Chapter of the A.F.A., raps a cast iron bell presented by a member. The tone compares favorably with that of a bronze bell of equal dimensions.

# *Aide-de-Camp to a*

# "CAT CRACKER"



*Buell cyclones as adapted for oil catalyst recovery in* 34 *catalytic cracking units*

## Buell Dust Recovery Systems help make 100-octane gas...

"CAT CRACKER" is the oil industry's nickname for the new catalytic cracking processes now producing high-octane gas—processes calling for the highest efficiency in the recovery of catalyst dust. It is significant that so many leading oil companies have chosen Buell (van Tongeren) Dust Recovery Systems for this important work.

The remarkable natural and synthetic catalysts used are both expensive and abrasive. Buell equipment (incorporating the exclusive van Tongeren "shave-off") pays for itself many times over in the recovery of the costly, finely divided catalyst. And Buell's large-diameter, extra-heavy metal cyclones eliminate clogging and reduce abrasive wear—for long life and continuous performance.

Here, as in so many other fields, Buell leadership has again demonstrated its ability to solve difficult dust recovery problems.

*Maybe Buell can help your business . . . Write for Bulletin G-842, describing Buell equipment and its application in many industries*

BUELL ENGINEERING COMPANY, INC.
14 Cedar Street, New York 5, N. Y.
*Sales Representatives in Principal Cities*

buell
DUST RECOVERY SYSTEMS

*BUY WAR BONDS AND MAKE THE AXIS BITE THE DUST*

# MEN ... of Industry

ROBERT E. KENNEDY has been re-elected secretary of the American Foundrymen's Association. At a recent meeting, the board of directors of the association combined the office of executive vice president with that of secretary, so that Bob Kennedy, as secretary, now becomes the administrative head of the A.F.A., replacing C. E. Westover who resigned recently as executive vice president to return to industrial work. The board of directors also announced the election of the following: C. E. Hoyt, treasurer; Norman F. Hindle, assistant secretary; William W. Maloney, staff assistant, and Jane Reininga, assistant treasurer.

Bob Kennedy was born in Vincennes, Ind., and was graduated in foundry practice from Winona Technical Institute, Winona, Ind., and in industrial education from the University of Illinois, Urbana, Ill. Following graduation he was an instructor in foundry practice at the University of Illinois from 1910 until 1917. During the first world war he was in service with the Ordnance Department, being assigned to the steel foundry at the Watertown Arsenal, and the Aberdeen Proving Grounds. After the war he returned to the University of Illinois as assistant professor in charge of foundry work. He also served as assistant superintendent of foundry training, United States Training Service, under the Department of Labor. In 1921 Bob became assistant secretary of the American Foundrymen's Association. He was elected technical secretary in 1925 and secretary in 1938. In addition to his long connection with the A.F.A., he has had a broad industrial background as chemist, molder, coremaker, time study man, assistant foundry saperintendent and mechanical methods engineer. Bob has played an active part in a number of A.F.A. projects, including the development of foundry sand control, pattern standardization, foundry refractories, etc. During recent years he has devoted much time and effort in the work of the various chapters of the association, and has given considerable assistance in the organization of those most recently added to the chapter family.

♦ ♦ ♦

**Daniel Sharpe,** recently elected president of the Institute of British Foundrymen, is technical executive of Federated Foundries Ltd. and is a director of Walter Macfarlane & Co. Ltd., Saracen Foundry, Possilpark, Glasgow. He is also chairman of A. & W. Smith & Co. Ltd.; chairman of R. G. Ross & Co. Ltd.; a director of Foundry Plant & Machinery Ltd., and of B. I. A. Patents Ltd. Mr. Sharpe served as junior vice president of the Institute of British Foundrymen during the past year and has been a member of the organization since 1920. He was president of the Scottish branch in 1936. Widely experienced in foundry and metallurgical work, Mr. Sharpe received his early training with Steel Co. of Scotland Ltd. at Glasgow and Newton, Acme Steel & Foundry Co. Ltd., Shettleston, and National Steel Foundry Co. Ltd., Leven, Fife.

♦ ♦ ♦

**Max F. Becker,** recently elected chairman of the Chicago Chapter of A.F.A., is vice president, Whiting Corp., Harvey, Ill. He has been associated with that company since his graduation from Purdue University in 1920. Serving first with the pulverizer division of Whiting, he spent several years in various departments prior to being made manager of the Whiting foundry equipment division. In 1939 Mr. Becker was made sales manager of the industrial division, and the following year he was appointed vice president in charge of sales representatives.

♦ ♦ ♦

**Carl E. Rowe** now is associated with Wolf Management Engineering Co., Chicago, as consulting management engineer. He attended Ripon College and Illinois Institute of Technology, and started his foundry work with International Harvester Co. in Milwaukee. Mr. Rowe held foundry supervisory positions with the latter company in Milwaukee and Chicago and with Carnegie-Illinois Steel Corp., Chicago, and engaged in time study and industrial engineering work with both organizations and with Grede Foundries Inc., Milwaukee, before entering professional industrial engineering. An active member of the A. F. A., he is secretary of the associa-

(*Continued on page* 118)

DANIEL SHARPE

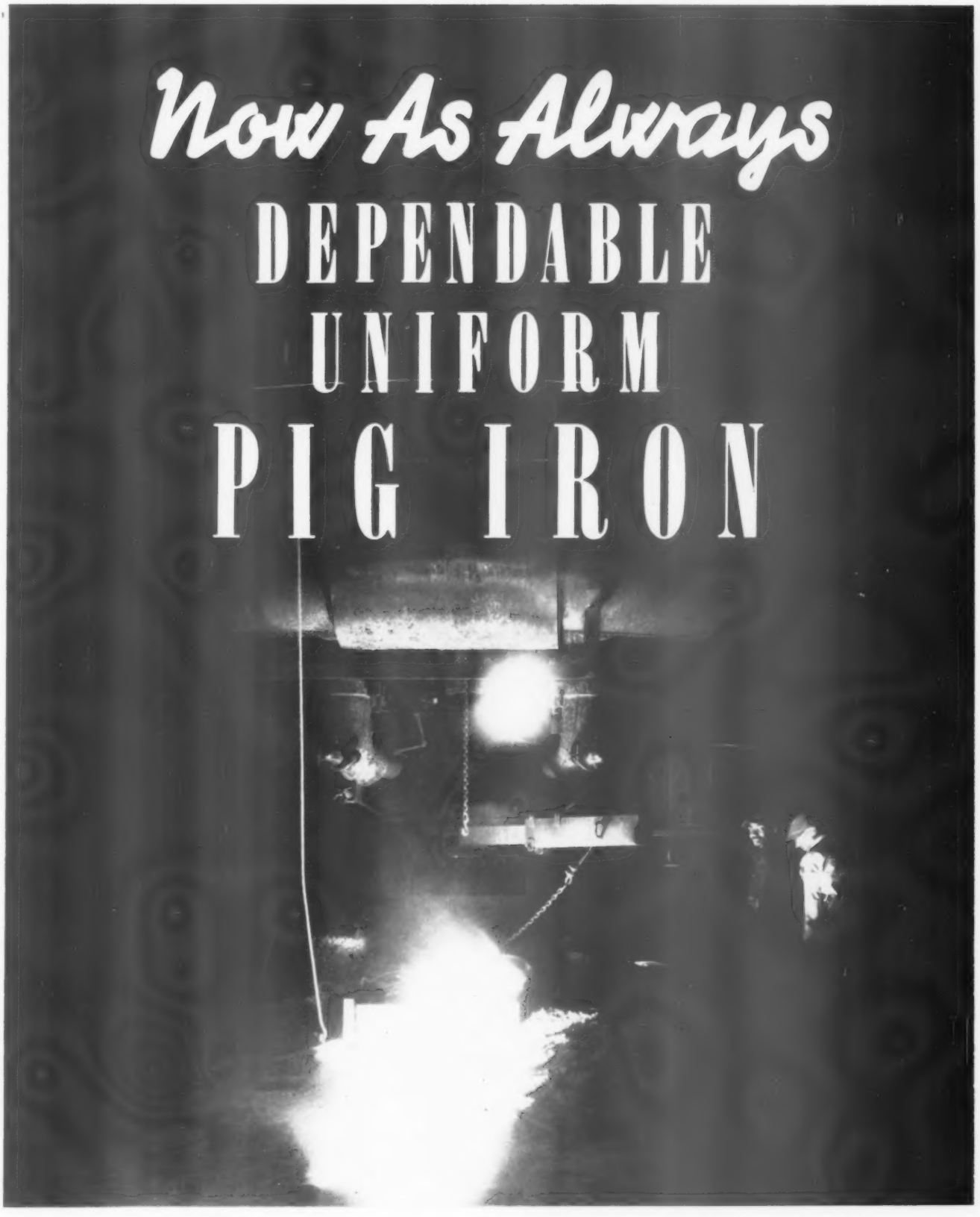
CARL E. ROWE

ROBERT E. KENNEDY

MAX F. BECKER

*Now As Always*

# DEPENDABLE UNIFORM PIG IRON



## WOODWARD IRON COMPANY

WOODWARD, ALABAMA

*America's Largest Completely Integrated and Entirely Independent Merchant Iron Producer*

INDEPENDENT SINCE 1883

(*Continued from page* 116)
tion's Job Evaluation and Time Study committee.

• • •

**P. M. Fleming** has been appointed vice president in charge of sales and operations for the Pittsburgh Rolls Division of the Blaw-Knox Co., Pittsburgh. Mr. Fleming formerly was vice president in charge of sales. **Ralph H. Scholl,** sales engineer, has been appointed manager of sales. **S. Clifford Elms,** chief engineer, has been named general superintendent. **W. H. White,** recently general superintendent, has been appointed metallurgical engineer in charge of research and new developments.

• • •

**Richard W. Murray** has been appointed brush engineering representative for the Connecticut and Rhode Island territory by the Osborn Mfg. Co., Cleveland, succeeding James G. Gammel, who has been transferred to the Cleveland office. Mr. Murray's headquarters are 153 South Main street, Wallingford, Conn.

• • •

**Lester D. Chirgwin,** general manager of the Buffalo plant of Farrel-Birmingham Co. Inc., Ansonia, Conn., has been elected a director. Mr. Chirgwin has been located in Buffalo since 1920 when he was made assistant to the general manager of the company's new plant there. He became production manager in 1923, assistant general manager in 1930, and has been general manager since January, 1943.

• • •

**Frank Cordes,** who resigned recently as chairman of Blaw-Knox Co., Pittsburgh, has been elected president and general manager of Pittsburgh Steel Foundry Corp., Glassport, Pa. He had been associated with Blaw-Knox Co. since 1929 when the Lewis Foundry & Machine Co., Pittsburgh and Groveton, Pa., of which he had been president since 1927, was absorbed and Mr. Cordes was made a vice president of Blaw-Knox Co. He was elected to the presidency of the latter in 1936 and to the chairmanship in 1937. Prior foundry connections included Hubbard Steel Foundry Co., East Chicago, Ind., and Wheeling Mold & Foundry Co., Wheeling, W. Va. In his new position Mr. Cordes succeeds Parker F. Wilson.

• • •

**Arthur M. Penhallow** has been appointed controller of the Osborn Mfg. Co., Cleveland. His prior connections include vice presidency of the Grabler Mfg. Co., Cleveland, and at one time he was vice president and treasurer of Dodge Mfg. Corp., Mishawaka, Ind.

• • •

**Harry F. Lange,** controller of the Ordnance Steel Foundry Co., Bettendorf, Iowa, and **Frank V. Bigelow,** treasurer and controller of the Malleable Iron Fittings Co., Branford, Conn., have been elected to membership in the Controllers Institute of America.

• • •

**John T. Llewellyn,** president, Chicago Malleable Castings Co., Chicago, and Allied Steel Castings Co., Harvey, Ill., was tendered a testimonial dinner at the South Shore Country Club, July 7, by approximately 150 of his associates in the two companies on the occasion of his eightieth birthday. He established Chicago Malleable in 1899 and Allied Steel Castings in 1918.

• • •

**Jack Meyer** has been appointed vice president and general superintendent of National Alloy Steel Division of Blaw-Knox Co., Pittsburgh. **L. T. Anderson** has been named vice president in charge of sales and engineering.

• • •

**Francis O. Clukies** has joined the sales staff of Robins Conveyors Inc., Passaic, N. J., and will be connected with the New York office of that organization. Mr. Clukies will specialize in products of the Mead-Morrison Division. He was with the Mead-Morrison Mfg. Co. for some 30 years before Robins bought out the materials handling part of that company. Since then he has been in business for himself.

• • •

**Robert C. Woods** has been appointed director of industrial research, Picker X-Ray Corp., New York. Prior to joining that organization, Mr. Woods was director of research, Taylor-Winfield Corp., Warren, O., and previous to that was physicist, the Bell Aircraft Corp., Buffalo. Mr. Woods has been a member of Committee E-7 of the A.S.T.M., a member of the American Physical Society and a fellow of the American Association for the Advancement of Science.

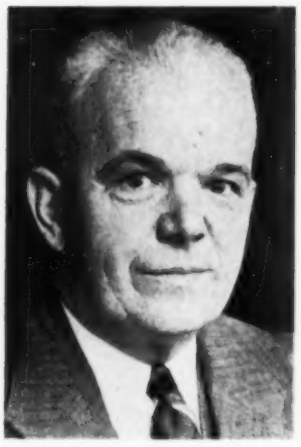
• • •

**J. B. Peake,** formerly New York district sales manager, has been appointed assistant general manager of sales for Mathieson Alkali Works, New York. In his new capacity, Mr. Peake will be assistant to D. W. Drummond, general manager of sales. Mr. Peake was born, July 25, 1894, in Norfolk, Va., and graduated from Washington and Lee University in 1915. During World War I, he served as first lieutenant in the Coast Artillery attached to the 29th Air squadron as aerial observer. He joined the New York office of Mathieson Alkali Works in 1920, later being transferred to the Charlotte, N. C., district sales office. Subsequent posts held by Mr. Blake were district sales manager for the Chicago, Cincinnati and New York territories.

• • •

**John Easton** has been appointed director of the development and standardization activities, Whiting Corp., Harvey, Ill., succeeding A. J. Brown who has been made manager of the Pacific Coast Branch. Mr. Easton was born and educated in Scotland and received a degree in mechanical engineering from the University of Edinburgh. An apprenticeship as a mechanical engineer with a builder of steam engines was interrupted by World

(*Continued on page* 120)



P. M. FLEMING

W. H. WHITE

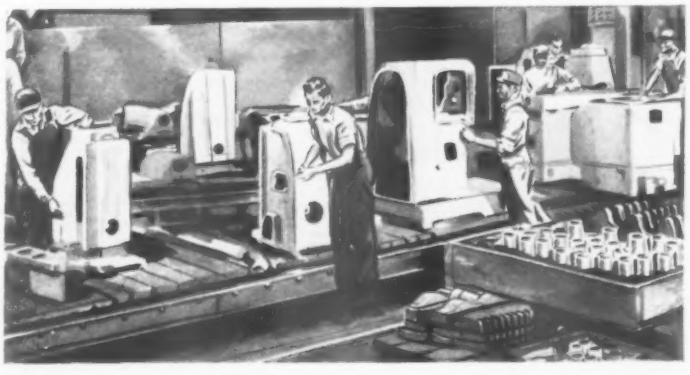
RALPH H. SCHOLL

S. CLIFFORD ELMS

# SAVE TIME *up to 50%*
## with Truline Binder

**IN CORE ROOM** . . . Truline Binder mixes readily with green, dry, or reclaimed sand. Core mixes flow readily, ram quickly, thus enabling your core makers to turn out *more cores per hour.*

**IN BAKE OVEN** . . . Because it fuses, then hardens, Truline forms a strong bond at comparatively low temperatures, bakes faster than do slow-baking binders which must be oxidized. *Consequently baking time is sharply cut.*



**IN CLEANING ROOM** . . . Because Truline burns out readily, the core collapses and disintegrates, making it easier to knock out the core sand. This saves cleaning time—*eliminates one* common bottleneck!

### GET MORE *OKAY* CASTINGS

And here's another Truline advantage . . . *especially to foundries turning out high-shrinkage, non-ferrous castings!* Because Truline-bonded cores collapse readily, metal contraction is not hindered, hot tears are minimized. Rejects are, therefore, kept low . . . and production boosted.

For further information or a sample, fill in the coupon below. No obligation.

TRULINE BINDER

HERCULES POWDER COMPANY
INCORPORATED
999 Market St., Wilmington, 99, Del.

Please send ☐ sample ☐ information on how to use Truline Binder in casting:
(state type of work and kind of metal cast)

Name _____ Title _____ State _____
Company _____ City _____ 33-59
Address _____

(*Continued from page* 118)

War I. Mr. Easton entered the Royal Navy and later was commissioned a second lieutenant in the Royal Air Force. Since coming to America a few years after the war, he served first with Chrysler Corp. as an engineer on plant layout and later worked for several aircraft companies in an engineering capacity. Since 1930 he has been connected with the Civil Aeronautics Administration, recently as chief of the Technical Development Division.

♦ ♦ ♦

**Lieut. (j. g.) Herbert E. Cragin Jr.,** USNR, formerly foundry manager of the Taylor-Wharton Iron & Steel Co., High Bridge, N. J., has reported for duty with the Bureau of Ships of the Navy Department in Washington. Lieutenant Cragin was graduated from Princeton University with a bachelor of science degree in 1933 and a civil engineering degree in 1934. He joined Taylor-Wharton in the summer of the latter year as a student engineer. For the past several years he has been in full charge of all alloy steel foundry operations at High Bridge.

♦ ♦ ♦

**Dewey C. Harvey** has been promoted to chief plant engineer of the Osborn Mfg. Co., Cleveland. Prior to joining the company in 1935, Mr. Harvey served

DEWEY C. HARVEY

in the engineering departments of Peerless Motor Co., C. O. Bartlett & Snow Co. and the Bender Body Co. He served overseas during World War I as a member of the United States Marines.

♦ ♦ ♦

**Frederic I. Lackens,** advertising manager of the Hays Corp., Michigan City, Ind., has been elected president of the National Industrial Advertisers Association Inc.

♦ ♦ ♦

**Herman C. Price** has been appointed a vice president, Kalamazoo Stove & Furnace Co., Kalamazoo, Mich. Mr. Price had been associated with Sears, Roebuck & Co., Chicago, where he headed its major appliances business.

♦ ♦ ♦

**Viola L. Schmidt** completed 30 years in the employ of the Standard Brass Works, Milwaukee, on Aug. 8. A party celebrating the anniversary was held at the summer home of Roy M. Jacobs, president of the company, at Oconomowoc, Wis., with company officials and business associates present. At

VIOLA L. SCHMIDT

that time Miss Schmidt was presented with a diamond wrist watch as a gift of the company. Burleigh, Roy and Kenneth Jacobs, principal owners of the company, presented Miss Schmidt with a block of stock, and at a recent meeting of the board of directors, she was elected treasurer of the company. Miss Schmidt was born in Milwaukee on Dec. 14, 1896. After elementary schooling she attended North Division High School for 2 years and Hoffmann's Business College for 1 year. On Aug. 8, 1913 she was employed by the Standard Brass Works and worked for Kenneth W. Jacobs Sr., then president of the company. In addition to her duties as treasurer, she is office manager and has the responsibility of handling priority matters and ordering metals.

♦ ♦ ♦

**James G. Gammel,** formerly industrial brush representative in New England for the Osborn Mfg. Co., Cleveland, has been promoted to the position of technical assistant in brush engineering service at the company's home office. He will act as assistant to G. O. Rowland, Osborn executive who is serving as chief of WPB's Industrial Brush Unit.

♦ ♦ ♦

**L. A. Brown** has been appointed vice president in charge of manufacturing and works manager for all plants of Landers, Frary & Clark, New Britain, Conn. He joined the company in 1921 as an apprentice toolmaker. In 1929 he was put in charge of the home laundry equipment tool department and after 2 years was given control of the machine and tool rooms in the Universal lower plant. In 1938 Mr. Brown was appointed mechanical superintendent for all Universal plants and in 1941 was made works manager of Universal's lower plant. From this position he succeeds H. C. Edgerton, former Universal works manager who retired because of ill health.

♦ ♦ ♦

**Dr. Robert I. Jaffe** has been appointed to the technical staff of Battelle Memorial Institute, Columbus, O., where he will be engaged in nonferrous metallurgical research. A graduate of the Illinois Institute of Technology, he received his master of science degree from Harvard University and his doctorate from the University of Maryland. Dr. Jaffe recently was associated with Leeds & Northrup Co., Philadelphia.

♦ ♦ ♦

**James N. Nutt Jr.** has become associated with Wright Aeronautical Corp., Cincinnati, as junior metallurgist in the metallurgical laboratory.

♦ ♦ ♦

**Eugene P. Harter** has been made general sales manager of Electro Refractories & Alloys Corp., Buffalo. Serving as sales manager of the company's grinding wheel division since October, 1941, Mr. Harter takes over the sales adminis-

EUGENE P. HARTER

tration duties of Grant S. Diamond, vice president, who has assumed broader executive and management responsibilities as a result of the recent death of Luke U. Milward, president. Mr. Harter joined the company in June, 1941, leaving Universal-Cyclops Steel Corp., Titusville, Pa., where for several years he was engaged in sales and administrative work in tool steels.

♦ ♦ ♦

**G. W. Thomson** has been appointed abrasive engineer for Norton Co., Worcester, Mass., in the territory including the states of Oklahoma, Arkansas, western Tennessee, and the northern part of

(*Concluded on page* 122)

# SPO MOLDING MACHINES REQUIRED NO REDESIGNING TO *Go to War!*

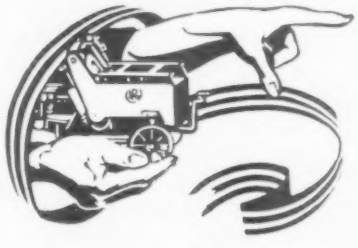
No. 100 Series. Fast flexible machines for matchplate molds.

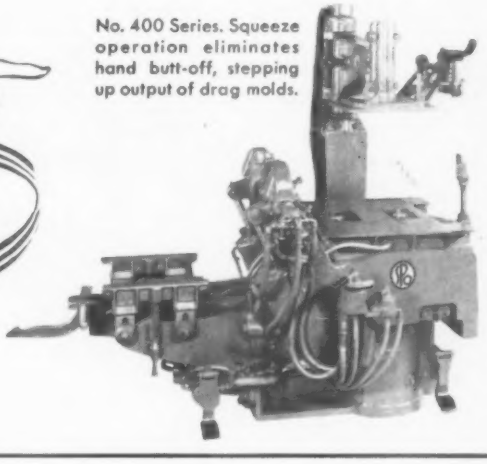
When war came, SPO Molding Machines were ready to pick up the increased pace that came with it. They have caused no exasperating delay by failing to stand the gaff of round-the-clock schedules. Operators, given a SPO machine, pattern, flask, sand and supervision, are turning out good molds with satisfactory speed in a very short time.

*Simplicity* is the answer! Examine these four illustrations. You see here clean, business-like compactness of design which spells speed in your production line and quality in your castings.

Our policy is to pool the data and requirements received from you as practical foundrymen and *continuously* to incorporate the desired features in our line, so that each SPO is a lasting investment in production and profit. . . Thinking ahead for the future? One thought: *the future begins now.* For us, that means the *next machine.*

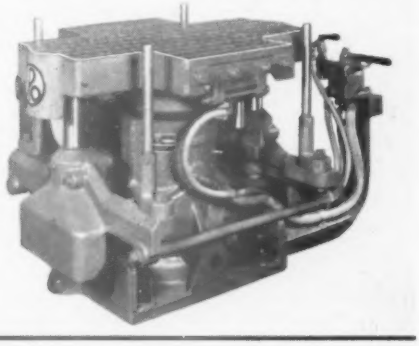
No. 200 Series. Profitable for both jobbing work and fast production of cope and drag molds.





No. 400 Series. Squeeze operation eliminates hand butt-off, stepping up output of drag molds.

No. 300 Series. A real "Handy Andy", because readily adapted to a wide variety of flask sizes and shapes.



SPO INCORPORATED

*Manufacturers and Specialists in Molding Machines, Vibrators and Patterns for Production*

7500 GRAND DIVISION AVENUE • • CLEVELAND, OHIO

(*Concluded from page 120*)

Texas, Louisiana and Mississippi. **Henry L. LeMay,** formerly of the sales engineering department at Worcester, will take over Mr. Thomson's former territory in northern Illinois. **J. P. Landers,** who has been located in the research laboratories and sales engineering department at Worcester, now is doing field engineering work in New York and New Jersey under the direction of the Philadelphia office.

♦ ♦ ♦

**Dr. Eugene M. Baroody,** physicist, has been named to the technical staff of Battelle Memorial Institute, Columbus, O., where he will conduct special research investigations in applying high frequency vibrations in the field of industrial physics. A graduate of University of Richmond (Virginia) and Cornell University, Dr. Baroody was formerly an instructor in physics at the University of Missouri.

♦ ♦ ♦

**K. C. Gardner,** recently vice president and general manager, United Engineering & Foundry Co., Pittsburgh, has been elected executive vice president and general manager. **Geoffrey B. Beard** has been elected vice president in charge of sales engineering, **John L. Young** has been made manager of industrial research, and **William Hagel** has been appointed manager of machinery sales.

♦ ♦ ♦

**C. E. Jarchow,** comptroller, International Harvester Co., since April 1936, has been elected vice president and will bear the title of vice president and comptroller. Prior to joining the company 29 years ago, Mr. Jarchow was employed by American Steel Foundries, Chicago.

♦ ♦ ♦

**E. R. Dougherty,** formerly general sales manager of Chicago Steel Foundry Co., Chicago, has joined Michiana Products Corp., Michigan City, Ind., to engage in sales work in both the alloy and sheet metal divisions. **John H. Staiger,** recently metallurgical engineer with La-Salle Steel Co., Hammond, Indiana, has become associated with the Michiana metallurgical staff.

♦ ♦ ♦

**James L. Hagen** has been named district manager for the state of Michigan for Alloy Casting Co., Champaign, Ill., and **E. W. Bock** has been appointed representative for Wisconsin and Minnesota. Mr. Hagen is located in Detroit and Mr. Bock in Milwaukee.

♦ ♦ ♦

**N. W. Schwenk** has resigned as divisional vice president of Cramp Brass & Iron Foundries Division, Baldwin Locomotive Works, Philadelphia, after 39 years with the company.

♦ ♦ ♦

**James R. Cady,** formerly foundry engineer and staff assistant, Columbia Steel Co., Pittsburgh, Calif., now is research engineer, Battelle Memorial Institute, Columbus, O.

## Buffalo Wins 1944 A.F.A. Congress

The Third War Production Foundry Congress of the American Foundrymen's Association will be held in Buffalo, the week of April 25, 1944, according to a recent announcement. All phases of the event will be housed in Buffalo's new Memorial Auditorium, one of the finest municipal halls in the country, with splendid facilities for the Production Congress and the forty-eighth Annual Meeting of A.F.A.

Provision will be made for suppliers of equipment and materials to demonstrate the utility of their products in war production and conservation of materials, through use of exhibit booths for conference and consultation and displays of models, products and equipment. The expected character of such displays is indicated by the following paragraph from the resolution adopted by the Board of Directors on July 21:

"Be it further resolved that with a view to complying with the request of the Office of Defense Transportation to hold to a minimum freight and truck transportation, exhibitors be restricted to the use of standard booth equipment supplied by the association and which is available in the city of Buffalo, and that no 'built booth' displays be permitted."

Selection of Buffalo followed receipt of an invitation from the Convention and Tourist Bureau of that city, strongly supported by unanimous action of the directors of the Western New York Chapter of the A.F.A. Annual meetings of foundrymen have been held in Buffalo twice previously, once in 1912 with an exhibit, and once in 1901 without an exhibit.

## Gray Iron To Get More Publicity

Gray Iron Founders' Society, Cleveland and Washington, entering upon a broad educational program intended to widen appreciation and use of the product and services of the nation's gray iron foundry industry, has appointed John P. Mullen to its newly-created post of educational director, according to a recent announcement by W. W. Rose, executive vice president.

JOHN P. MULLEN

Mr. Mullen, who received his training at Notre Dame University, South Bend, Ind., St. John's University, Toledo, and in the metropolitan and community newspaper fields, has had 20 years' experience in public relations, publicity and advertising. Shortly after his graduation in 1923, he became assistant educational director of the Investment Bankers Association, a connection he held until 1932. After several years of free-lancing, including publicity and editorial work for the National Poultry, Butter and Egg Association, he joined Vocalpix Presentations, Inc., Chicago, to do scenarios for industrial sales, service and employe-training sound-slide and motion picture presentations. Later he became associated in a public relations capacity with the W. E. Long Co., Chicago, advertising counselors. For the last 7 years he was publicity director of the Chicago Mercantile Exchange.

The society's informational-promotional program, conceived by the membership and developed in the enthusiasm and unwearying effort of its publicity committee headed by Edward C. Hoenicke, Eaton Mfg Co., Detroit, has these among its first objectives:

1. To serve the merchandising and the technical needs of gray iron producers by acquainting designers and engineers with those properties of the material which make it especially valuable in so many and varied applications and by providing closer industry co-operation with the nation's technical schools.

2. To familiarize the public and government with the place of the gray iron foundry industry and with its essential contributions to the nation's progress.

3. To integrate the merchandising viewpoint into the entire functioning of the industry.

## Book Review

*Proceedings* of the Institute of British Foundrymen, cloth, 255 pages, 7¼ x 9¾ inches, published by the Institute of British Foundrymen, Manchester, England.

This volume constitutes the thirty-fifth of the annual compilations of papers presented at various meetings of the Institute of British Foundrymen and includes those delivered during the 1941-1942 session. It comprises 17 papers and discussions relating to gray iron, light metals, steel, malleable iron, pattern-making, brass and bronze, and other phases of the foundry industry. Five of the papers are those presented at the annual general meeting of the institute while the remainder were given at various branch meetings. In addition the book gives a resume of the annual meeting, annual report of the institute, annual report of the technical committee, and the presidential address of Major Richard Miles. It is well illustrated and contains in addition to a subject index, an author index.

# For BETTER CORES *and* BETTER CASTINGS

GOOD foundry practice necessitates the use of core oils that, when combined with sand and binders, will produce strong, smooth cores . . . cores that insure the production of better castings.

PEERLESS Core Oils contain a high percentage of vegetable oil, and are used by all types of foundries with uniformly successful results. Being void of moisture and volatile organic matter, PEERLESS Core Oils are free from the excess formation of gases. PEERLESS Core Oils combine at high ratios with either bank or lake sand . . . baking at temperatures ranging approximately between 400° to 450° F.

## *Consult the* APEX *Technical Department*

Our technical department is available to discuss and recommend the most economical and efficient grade of PEERLESS Core Oil for your purpose.

**APEX** INDUSTRIAL OILS AND CHEMICAL COMPOUNDS

APEX MOTOR FUEL COMPANY • INDUSTRIAL DIVISION

GENERAL OFFICES AND WORKS • 1401 W. NORTH AVE. • CHICAGO, ILL. • Phone ARMITAGE 7720

# Among DETROIT Foundries

BY A. H. ALLEN
Detroit Editor,
The Foundry

RESHAPING of the Army's needs for various types of combat equipment, occasioned by the advent of a new phase in the European war, is exerting important influence on foundry operations in the Detroit area, present and future. This, together with an increasingly critical manpower situation, makes the picture at the moment rather complicated.

An appreciable slowing down of tank construction is one of the first phases of the ordnance department's changing tactical needs. This is not a recent development, for it has been apparent since the first of the year that the tank program was certain to be scaled down. At first it appeared that tanks would give way in part to tank-destroyer types of vehicles, built on the same basic hull and track design, but with less top armor and heavier-caliber guns. Now it develops that the tank destroyers themselves may take second place to new types of high-speed armored cars and track-laying vehicles, with greater mobility and firepower but with perhaps even less armor protection.

### Reduce Steel Castings

One immediate result of this evolution is a reduction in the amount of steel castings needed for combat tank construction, and secondarily a revision in the design of various castings which might still be used in the newer types of vehicles.

There are four principal tank arsenals in this area, and a tremendous tonnage of steel castings has found its way to their assembly lines. By the end of the year one of these plants will have closed out the manufacture of tanks altogether and will have switched over to the manufacture of aircraft and aircraft engine parts. Doubtless by that time details will be made public on several of the new types of armored cars and self-propelled gun mounts toting up to 155-millimeter high-velocity rifles. Little can be told of them at the moment.

Coincident with the numerous changes in the tank program has come a plan for production of large quantities of heavy-duty, six-wheel drive trucks for conveying men, equipment and supplies in theaters of action. This is in addition to the substantial production schedules on trucks now in force. Breakdown of the proposed program by sizes shows about one-fifth 2½-ton, one-fifth 6-ton, two-fifths a new 8-ton model and the balance 10-ton and over. Output figures now being talked run into six figures.

The job of lining up production facilities for engines, axles, transmissions, differentials and other parts for such a huge fleet of transports is no insignificant one and a chief bottleneck is in respect to foundry capacity—for motor blocks, flywheels and the many other cast items going into truck assemblies. Naturally the program will not be localized in the Detroit area, since it will be necessary to call on facilities far afield if schedules are to be met.

### Design New Engines

Emphasis on the 6, 8 and 10-ton models makes the project particularly tough, since in the past truck manufacturers have found their principal models in the light tonnage classifications. Some new engine designs likely will be necessary, and additional facilities are imperative for machining the large components going into transmissions and axles. While these facilities are now in process of being co-ordinated, the actual manufacturing program is not scheduled to start until sometime later.

It is believed in some quarters that this comprehensive truck program may serve to take up the slack resulting from curtailed tank production, and for some shops this may be true. Steel foundries supplying tank castings are being studied in the light of switching their production over to truck castings. One problem here, however, is that machining of steel castings for truck parts is more difficult than processing the malleable iron castings for which certain parts are now designed. The inference is drawn from this that steel foundries might be asked to convert to malleable iron production, although it may appear more feasible to change machining setups to accommodate steel castings instead of trying to convert foundry facilities, some of which only recently have been converted from gray iron to steel.

Manpower problem in foundries in the Detroit district is becoming more acute, mainly as the result of the draining off of available supply by plants paying higher wages and offering somewhat more favorable working conditions. The local office of the War Manpower Commission is investigating the problem under direction of M. A. Clark, but the outlook is discouraging.

Gray iron foundries in particular are said to be hard hit by manpower problems. Other industries have been able to fill gaps by drawing women into plants, but this is not so readily accomplished in foundries where the work is not at all suited to women operators because of the manual labor, heat and grime involved. Furthermore, when even an unskilled laborer can often obtain a comfortable machine job at good pay in comparison with a foundry, and learn the machine operation in a matter of weeks, he is not disposed to continue in foundry work, even though he might be partial to it. One small Detroit foundry, with normal peak employment of 200, has hired 495 in the last 3 weeks and has not yet reached peak employment because of the extreme rate of turnover. Such inordinate turnover also is likely to mean a jump in the number of scrapped castings produced as the result of faulty work.

### Upgrading Over Done

Shortage of unskilled help in Detroit springs from the effective job plants have done in mass-upgrading this type of labor into skilled and semiskilled jobs. There is even a suspicion that right now there is something of an oversupply of this upgraded labor which certainly is going to resist to the last ditch any attempt to downgrade it into former unskilled jobs. This is one of the strange anomalies of war production: First, there was a dire shortage of skilled labor and superhuman efforts were called for to upgrade and train a sufficient supply of machine operators and others in the skilled trades. Now this has been fairly well accomplished and the drouth hits common labor and the unskilled trades.

The $64 question is how to persuade a man making $1.10 an hour sitting comfortably by a machine to go back into the foundry and sweat at 90 cents an hour?

New hybrid melting equipment known as the blastola (name coined by Whiting Corp. from combination of blast furnace plus cupola) has melted its first heat at Rotary Electric Steel Co. where

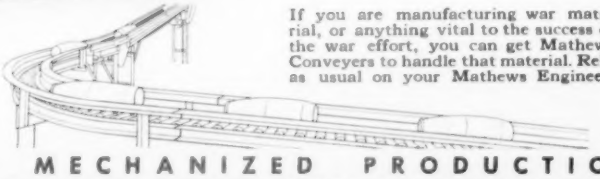
(*Concluded on page* 128)

# DISH IT OUT *Faster!*

THAT'S THE WAY TO WIN this war . . and that's the way to speed production of vital war material.

Keeping materials, parts and supplies moving to waiting machines and eager hands with a Mathews Time-Controlled and Coordinated Conveyer System is a sure-fire means of making production schedules "click."

Mathews Engineers are helping American War Industries dish it out Faster; perhaps they can help you also.



If you are manufacturing war material, or anything vital to the success of the war effort, you can get Mathews Conveyers to handle that material. Rely as usual on your Mathews Engineer.

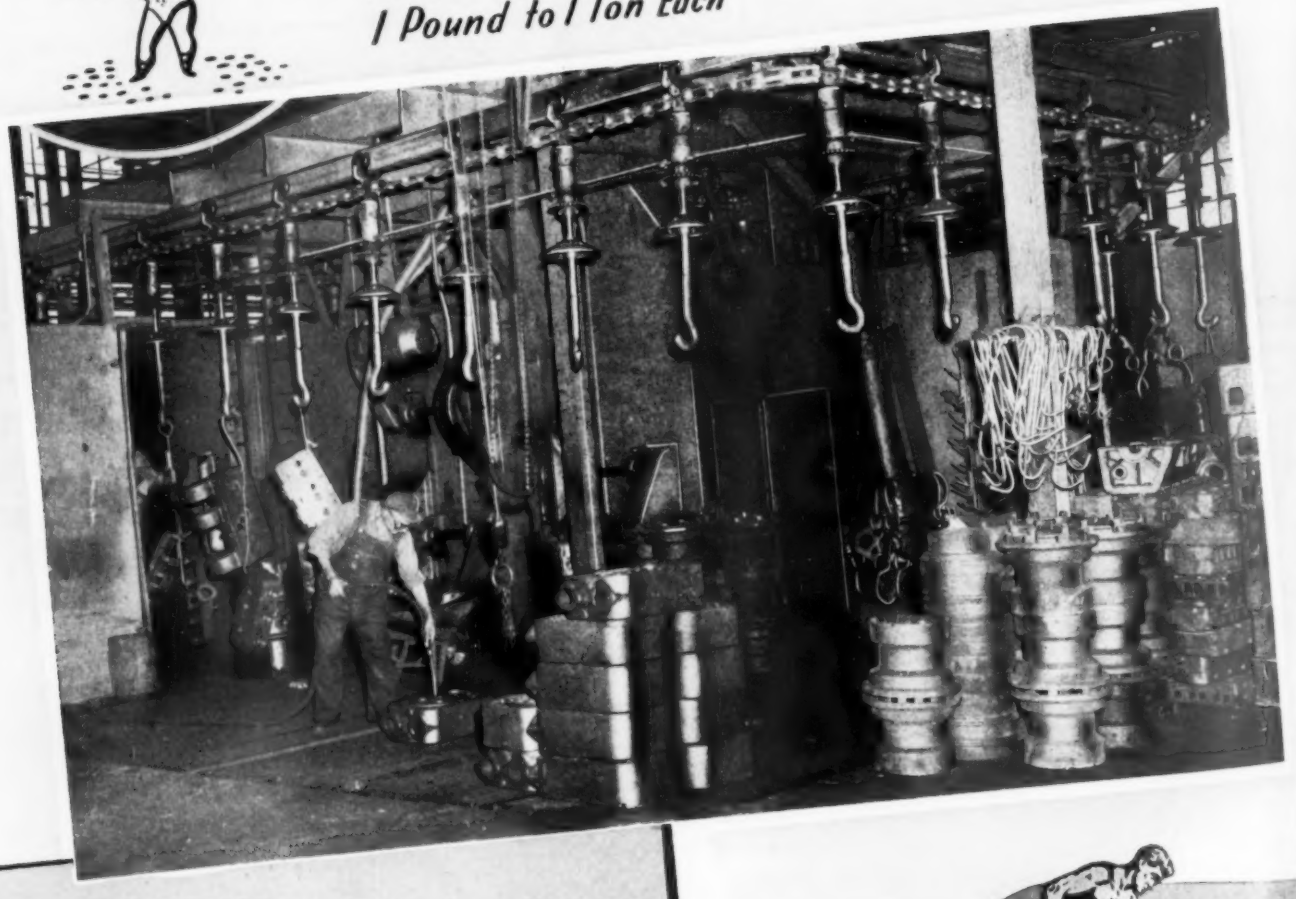
MATHEWS CONVEYERS FOR MECHANIZED PRODUCTION

**MATHEWS CONVEYER COMPANY** ELLWOOD CITY PENNSYLVANIA

# 1 Wheelabrator Cabinet Cleans 95% of All Production at Spring City Foundry

Division of Grede Foundries Inc.

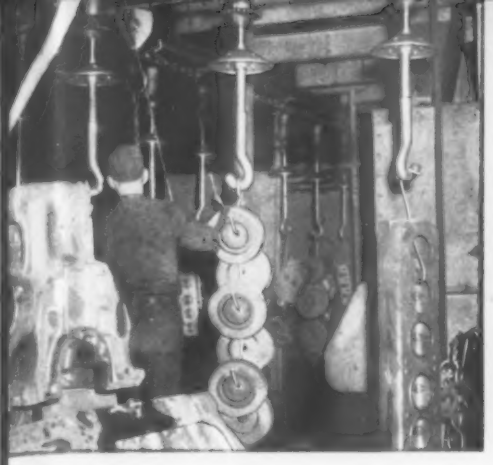
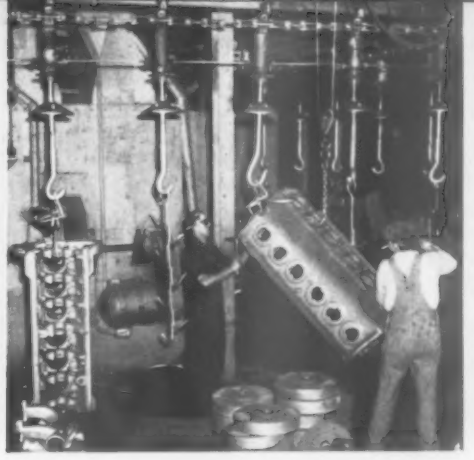
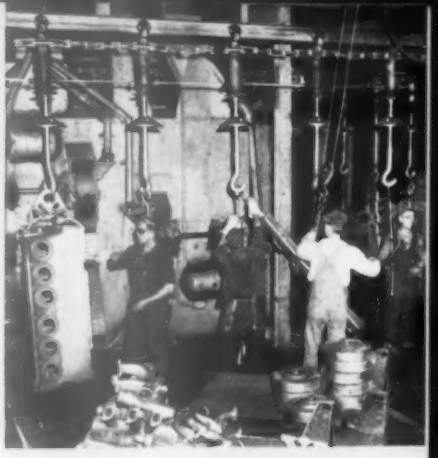
Handles Work Weighing
1 Pound to 1 Ton Each



Worlds Largest
Builders of Airless
Blast Equipment

ARMY E NAVY

TRADE MARK REG. U. S. PAT. OFFICE

MORE than 20,000 tons of gray iron, steel and alloy castings were produced in 1942 by Milwaukee Steel Fdy., Milwaukee; Spring City Foundry, Waukesha, Wis., and Liberty Foundry, Wauwatosa, Wis., operating as divisions of Grede Foundries, Inc. The majority of this tonnage was cleaned in Wheelabrator equipment with a decided improvement over former cleaning methods in speed, quality and cost.

Most of the larger castings, such as cylinder blocks, manifolds, hubs, etc., are produced at Spring City Foundry Division. The problem in cleaning this production was to obtain equipment that would handle a range of work varying widely as to size, shape and weight. Castings often weigh as much as 2,000 lbs., though a large part of the production consists of smaller pieces, some weighing as little as one pound.

### MONORAIL CONVEYOR USED

After thorough investigation of the quantity, size and weight of work to be cleaned, a Wheelabrator Special Cabinet with a heavy-duty monorail conveyor system was installed. Three Wheelabrator blast units 19½" in diameter x 2½" wide, each throwing 450 pounds of steel abrasive per minute are mounted on one side of the heavy steel plate cabinet. These Wheelabrator units are staggered as to height from the floor to give an abrasive blast coverage to all parts of the work and provide for cleaning a wide range of work sizes.

At the present time over 95% of the foundry's entire production of green castings is handled through the cabinet, with approximately half the total tonnage cleared through a second time to remove scale after the heat treating process.

### CAPACITY: 4 TO 6 TONS PER HOUR

Cleaning capacity of the high production cabinet ranges from four to six tons an hour, depending upon the work being handled. Since some of the castings produced are very small, special "Christmas tree" hooks were designed to handle them.

Work is staggered on the hooks, with very large pieces in one position and a group of smaller pieces on adjacent hooks.

### REBOUNDING ABRASIVE IS PUT TO WORK

On entering the cabinet, the work traveling parallel to the blast wheels (but at the far side of the cabinet) is hit by abrasive that missed work directly in front of the wheels and by abrasive that rebounds from work at other positions in the Cabinet. The conveyor moves each hook one station at a time, and in normal operation, 40 hooks pass through the machine per hour, each with a maximum loading capacity of 2,000 pounds.

### NO "TOUCH-UP" ROOM IS NECESSARY

In front of each of the three Wheelabrator blast units the casting-laden hook is stopped and rotated in the abrasive stream. Since the abrasive field of each wheel strikes the rotating casting at a different angle, all crevices and pockets of intricate castings are thoroughly cleaned. Because of this complete cleaning, which removes every trace of foundry sand or scale, it was unnecessary to provide a "touch up" room for manually cleaning these hard-to-get-at corners or pockets with an airblast nozzle.

Multi-pass of work before the three wheels is provided to permit the maximum cleaning action from the abrasive and at the same time to shield the walls of the cabinet from direct abrasive blast.

*NOTE: A new Wheelabrator is now on order for Grede Foundries Inc. newly acquired Smith Steel Foundry Division.*

**AMERICAN**
**FOUNDRY EQUIPMENT COMPANY**
505 SOUTH BYRKIT STREET, MISHAWAKA, INDIANA

(*Concluded from page 124*)

it is being used to supply hot metal of controlled analysis for electric furnace refining. It is an elaborate and unusual installation, the melting unit being 138 inches in diameter with about a 21-inch lining. Jacket is water cooled and a hot air blast is used with air in the 400-600 degree range. Charging is by means of skip hoist feeding into the top. Iron is tapped into one of two new 75-ton steel ladles, where it is desulphurized and then transferred to 35-ton ladle cars which move it to basic electric furnaces where the metal is dephosphorized and refined to steel of desired analysis.

Idea behind the installation which was completed in 5 months under DPC financing, is to permit using lower-grade scrap, speed up melting time and save on power costs in electric furnaces. W. H. Colvin Jr., president of Rotary, estimates capacity will be increased 25 per cent by the equipment. Although there is apparently no reducing action involved in the initial melting, there is the resemblance to a blast furnace in that it is the plan to operate continuously without dropping the bottom for a period of perhaps 6 months or a year, and eventually it may prove feasible to add a little iron ore to the present charge which comprises coke, limestone and scrap, the latter including briquetted turnings. A crusher and briquetting machine has been installed. Some early difficulties have been experienced with the water-cooled copper cinder notch, but as in all new ideas there are bound to be a few bugs to be worked out. The equipment was developed by Rotary engineers in cooperation with the technical staffs of Whiting Corp. and Arthur G. McKee & Co., with the added assistance of Lewis B. Lindemuth.

A similar installation is understood to be going in at the plant of Copperweld Steel Co., although this will be used as the initial phase of a triplexing process for making steel. One of the other early difficulties experienced by Rotary was that the furnace provided too much metal to be handled by present electric furnaces, so some means will have to be developed for slowing down the melt, possibly by reducing blast pressure.

AUTOMOBILE companies are proceeding with planning for postwar car production, even to the point of taking quotations on equipment for postwar installation. Included are plans for new foundries, Pontiac for example planning to double its present gray iron installation, and Cadillac talking new cupolas and electric furnaces. The latter are believed to be of more immediate character, the report being heard that plans are under way for centrifugal casting of Allison engine cylinder barrels. Cadillac engineers have been visiting plants doing this type of work preparatory to developing their own installation.

Albion Malleable Iron Co. is figuring on stepping up its capacity by 50 per cent without requiring added labor. Mechanization and conveyorization will be the principal means, although new melting equipment also will be needed.

## "M" Pennant Awarded Reading Foundry

*Reading Steel Castings and Reading-Pratt & Cady Divisions of American Chain & Cable Co. Inc. were honored at plant ceremonies held in Reading, Pa., July 16, when the "M" pennant, Victory Fleet flag and merit badges were presented by Col. Willard F. Rockwell on behalf of the United States Maritime Commission. Colonel Rockwell pointed out that the valves and steel castings being produced at Reading are playing a large and important part in the ship construction program. In accepting the award, Lee C. Wilson (shown second from right), general manager of the two divisions of the company and president of the American Foundrymen's Association, pledged continued support for the work ahead. Appreciation for the honor bestowed on the Reading plant was expressed by William T. Morris, president of American Chain & Cable Co.*

## Brake Shoe Acquires Electro Alloys

American Brake Shoe Co., New York, recently purchased the Electro Alloys Co., Elyria, O., a large producer of heat and corrosion resistant alloys. American Brake Shoe will operate the Elyria plant as a subsidiary. Walter G. Hoffman, manager of the alloy department, American Manganese Steel Division, American Brake Shoe Co., has been made president of Electro Alloys Co. W. C. Whyte, formerly president of the latter organization, will continue in much the same executive capacity under the title of vice president. The Electro Alloys Co. organization will be conducted and staffed much as in the past.

*Walter G. Hoffman*

American Brake Shoe Co. has been engaged in the manufacture of heat and corrosion resistant alloys since 1925. The activity has been carried on as a separate department of the company's manganese division. The capacity for production of this department and of Electro Alloys is at present about the same, but it is planned to expand the facilities of the Elyria plant.

Addition of Electro Alloys Co. brings the number of plants of the American Brake Shoe Co., to 59, located in 21 states and Canada. Products consist mainly of castings, forgings, nonferrous and anti-frictional material, automotive brake lining and automotive service equipment.

## Ajax Awarded "E"

Ajax Flexible Coupling Co., Westfield, N. Y., was presented the Army-Navy "E" award on Aug. 11. The pennant was received by W. T. Welch, president, from Lieut. Col. Herman F. Vieweg, Second Service Command, Buffalo, and presentation of employe pins was made by Lieut. (j.g.) L. A. Tallman, assistant to the resident inspector of naval material, Erie, Pa.

# The CORE OIL DOCTOR

Devoted to new ideas and case study reports on core room practice

*A group of armament parts cores, made with the Certified Core Oil prescribed by the Core Oil Doctor.*

**A Real Guarantee . . .**

You take no chances when you buy Certified Core Oil. Every shipment is laboratory-made with the definite understanding that the oil is as represented . . . that it runs strictly uniform in quality . . . that it will give complete satisfaction. Otherwise, it may be returned for full credit. Our customer is the sole judge.

Our binding guarantee is made possible by our definite knowledge of the results that follow when prescribed Certified Core Oil is used, regardless of the type of metal, sand, baking cycle or other operating conditions.

As core oil requirements vary widely, prescription ordering is essential. Among the various grades of Certified Core Oil is the right formula for every core job. With a full knowledge of the requirements, we are able to prescribe a core oil which we can guarantee — one that cuts costs, reduces gas, works better in the boxes and shortens the baking cycle.

Uniform quality is assured by laboratory control of every step in the production of Certified oils, and by our policy of compounding core oil formulae on a weight basis, which obviates the errors caused by expansion and contraction due to temperature changes.

We are able to guarantee satisfaction because of the number of foundries — large and small — ferrous and nonferrous — throughout the nation, where the use of Certified Core Oils has resulted in better cores, less discount, more satisfied core makers and reduced baking time, core breakage and cleaning costs.

The cost of the Certified Core Oil which will give these results in your foundry is probably no more — and possibly less — than you are now paying. It will be well worth your while to get prescribed core oil from the Core Oil Doctor. Write us fully, stating the type of core oil and sand used, the oil-to-sand ratio, what other binder is used, if any; the oven heat employed and a general description of the castings produced. Without obligation, we will prescribe the core oil which will provide maximum efficiency at the lowest cost.

## CERTIFIED CORE OIL & MFG. CO.

*"The House of Dependability"*

3306-26 South Cicero Avenue, Cicero, Illinois

Stock and Representatives: Buffalo, N. Y. Elmira, N. Y. Worcester, Mass. Reading, Pa. Newark, N. J. St. Louis, Mo. New Orleans, La. Houston, Tex. Chattanooga, Tenn. Minneapolis, Minn. Portland, Ore.

## "M" Award Made to Air Reduction Co.

*Scene at presentation of United States Maritime Commission "M" award to Air Reduction Co. Inc. at Bethlehem, Pa., on July 17 shows, left to right: Admiral Emory S. Land, chairman of the Maritime Commission; Walter J. Strawn, oxygen plant worker, representing the employes; C. S. Munson, president, and C. E. Adams, chairman, Air Reduction Co. Inc.*

## AMS Specifications For Castings

The accompanying table includes the latest Aeronautical Material Specifications (AMS) for nonferrous castings as standardized by the Society of Automotive Engineers Inc. and other associated engineering societies, representatives of federal agencies and aircraft manufacturers. Latest revision was in April of this year. Other AMS specifications not listed include wrought steels and nonferrous materials, processes such as zinc and cadmium plating, aluminum spraying, various protective and finishing treatments, pressure testing, magnetic inspection, methods of identifying machined parts, castings and forgings, corrosion preventatives, enamel, solvent, sealer and thinner compounds, synthetic rubber, etc. Further details relating to the specifications may be obtained by addressing the society at 29 West Thirty-ninth street, New York.

## Adds Pennant Stars

Cooper-Bessemer Corp. has received gold stars to be added to the "M" pennants awarded by the United States Maritime Commission to the company's Mount Vernon, O., and Grove City, Pa., plants. The presentation signifies maintenance of the production record established when the original award was made several months ago.

## Malleable Advisory Committee Picked

Organization of a Malleable Iron Castings Industry Advisory Committee which is consulting with OPA officials on malleable iron castings pricing matters was announced recently. At its first Washington meeting, the committee named R. R. Fauntleroy, Moline Malleable Iron Co., St. Charles, Ill., chairman, and Anthony Haswell, Dayton Malleable Iron Co., Dayton, O., vice chairman. Discussions were started on proposed revisions of certain sections of MPR No. 241 covering malleable iron castings.

Other members of the committee are: J. H. Redhead, Columbus Malleable Iron Co., Columbus, O.; Ralph N. Cole, Canton Malleable Iron Co., Canton, O.; Charles A. Gutenkunst Jr., Milwaukee Malleable & Grey Iron Works, Milwaukee; W. H. Moriarty, National Malleable & Steel Castings Co., Cleveland; John Wagner, Wagner Malleable Iron Co., Decatur, Ill., and F. L. Engels, Oriskany Malleable Iron Co., Oriskany, N. Y.

## Renews "E" Award

A second award for excellence of war production to the General Electric X-Ray Corp., Chicago, has been made by the Army and Navy. This adds a white star to the Army-Navy "E" flag which has flown over the company's plant since the award was first presented as of Jan. 26 this year.

### Aeronautical Material Specifications for Castings

| AMS No. | | | SIMILAR A-N AERO. OR FEDERAL SPEC.† |
|---|---|---|---|
| | | **ALUMINUM ALLOYS** | |
| 4210B | Castings | 5% Silicon, Copper, Magnesium — Aged | |
| 4212B | Castings | 5% Silicon, Copper, Magnesium — Solution Precipitation | AN-QQ-A-376 |
| 4214A | Castings | 5% Silicon, Copper, Magnesium — Solution and Overaged | |
| 4217 | Castings | 7% Silicon, Magnesium — Solution and Aged | AN-QQ-A-394 |
| 4220A | Castings | Copper, Nickel, Magnesium | AN-QQ-A-379 |
| 4222 | Castings | Copper, Nickel, Magnesium — Solution and Aged | AN-QQ-A-379 |
| 4231 | Castings | 4% Copper — Solution Precipitation | AN-QQ-A-390 Class II |
| 4240A | Castings | 10% Magnesium — 220-T4 | AN-QQ-A-392 |
| 4280 | Castings, Perm. Mold | 5% Silicon, Copper, Magnesium — Solution and Overaged | AN-QQ-A-376 Class B |
| 4282 | Castings, Perm. Mold | 4% Copper, 2% Silicon — Solution Precipitation | AN-QQ-A-383 Class B |
| 4284 | Castings, Perm. Mold | 7% Silicon — Solution and Aged | AN-QQ-A-394 |
| 4290A | Castings, Die | 12% Silicon — 13 | AN-QQ-A-366 Alloy 13 |
| 4292 | Castings, Press. Mold | 11% Silicon — As Cast | |
| | | **MAGNESIUM ALLOYS** | |
| 4420B | Castings, Sand | 6% Aluminum, 3% Zinc — As Cast | AN-QQ-M-56, Comp. A |
| 4422A | Castings, Sand | 6% Aluminum, 3% Zinc — Solution | AN-QQ-M-56, Comp. A |
| 4424B | Castings, Sand | 6% Aluminum, 3% Zinc — Solution Precipitation | AN-QQ-M-56, Comp. A |
| 4434A | Castings, Sand | 9% Aluminum, 2% Zinc — Solution Precipitation | AN-QQ-M-56, Comp. C |
| 4490A | Castings, Die | 9% Aluminum, 0.7% Zinc — As Cast | |
| | | **COPPER ALLOYS** | |
| 4840 | Castings | Bronze, 70% Copper, 25% Lead, 5% Tin | |
| 4842 | Castings | Bronze, 80% Copper, 10% Lead, 10% Tin | |
| 4845A | Castings | Bronze, 88% Copper, 10% Tin, 2% Zinc | |
| 4860 | Castings | Manganese Bronze | QQ-B-726 |
| 4862 | Castings | Manganese Bronze—High Strength | |
| 4871 | Castings | Aluminum Bronze—Heat Treated | AN-QQ-B-672 |

†The concluding paragraph of each specification deals with similar specifications and in cases where the use of a similar specification is proposed the user and the supplier shall determine, on the basis of the facts of the individual case, whether the proposed A-N, or other specification, is considered an acceptable alternate. The basic number of the similar specification is listed. However, the issue in effect at the date of invitation for bids or inquiry applies.

# THE MOST *IMPORTANT* DAY IS TODAY!

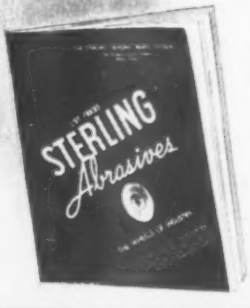
WITH unexpected changes in materials and unusual production schedules to meet, you may be experiencing difficulty in turning out work on time. Often, a change in the specification of your grinding wheels will accomplish a lot in keeping abreast of your delivery dates.

Casting cleaning has been found to be a job that can be accelerated by using wheels of special formulas for unusual work. Sterling's "Wheels of Industry" have been doing a most creditable job of helping foundry foremen and their men get castings through the cleaning department on time.

Sterling's engineers are specialists in meeting today's wartime grinding demands. Results from their recommendations prove that increases are possible when the correct grinding wheel is on the job . . . that today's important jobs can be completed today!

If we can be of assistance in helping increase speed of casting finishing in your foundry, please feel free to write today for the service of a Sterling engineer.

*SEND FOR THIS BOOK TODAY!*




Sterling Catalog No. 43 is just off the press. It contains important specification data you will want in your files. Ask for it on your own letterhead and we will send your copy at once.

• STERLING ABRASIVES •

THE
**STERLING GRINDING WHEEL DIVISION**
OF THE CLEVELAND QUARRIES COMPANY
TIFFIN, OHIO

THE WHEELS OF INDUSTRY

# the adventures of BILL

BY PAT DWYER

Drawings By RICHEY

SEEMS to me," said Bill the other night, "the mental processes of the younger—or as they say themselves the up and coming generation—are all gone galley west and crooked. You can't get a straight answer out of 'em. Instead of following a short, straight and direct line, they go around in circles."

"Well," I said, "I don't get around to any great extent, but I have met a few not so young people—not to be too specific—who seem to avoid the direct approach as if it was poison. I am waiting now for a certain party to come out of a tail spin and make some kind of a definite landing. Pull up your socks, my lad. Take a grip on yourself and maybe you can come in on a wing and a prayer."

"You can stow the side track gab, cunningly designed to lead me astray. I am coming in right on the beam. As an argumentive Scot, a loam molder I worked with one time in Farrel's used to say, 'Ah hae the documents forbye tae pr-r-r-oove it.'"

Deliberate and aggravating silence on the part of the party of the second part.

"I thought that would back you into your proper cubicle in the dog house where you can stick up your long ears, if the exercise is not too fatiguing, and listen while I read you a letter I had from one of my sons while I was away on vacation a few weeks ago.

HIGHLY ESTEEMED AND DEARLY Beloved Gaffer: With all the gang here, busy as so many beavers writing letters to you night and day, two, three and in some instances four pagers, there is practically no material left for me to piece out a proper, dutiful and respectful epistle. Your nice logical mind honed to a sweet-cutting edge through foundry training in the fine art of splitting hairs over nothing at all, probably will prompt you to point out calmly and without the least trace of impatience or rancor—or should that be rancour—I have not time to look it up—well anyway I expect you to point out that up to the present no competent authority has made the extraordinary claim that beavers write letters. To which I might counter with the equally unassailable statement that no person, up to the present, actually has come out boldly with the statement that beavers do not write letters!

It has been established beyond the shadow of reasonable doubt that these interesting little stinkers cut down trees—trees mind you to which they have neither legal nor moral claim—as neatly and cleverly as any lumberman. So far as my modest researches have extended, the only difference between the technique of the biped and quadruped lumberers—if there is such a word, and if not there should be—is that our little furry friend does not sit up on his hunkers just before the tree falls, throw back his head a la Tarzan, open his trap and yell TIMBER-R-R at the top of his voice. From a general nuisance standpoint the beaver seems to be one up.

However, that is all beside the point. The gremlin perched on my shoulder tried to make me say pond and then you would have another item on which to start one of your everlasting arguments. I know, I know (Legitimate and deliberate repetition) I know perfectly well that the beaver lives in a dam and not in a pond. Or does he? Damf I know for sure. Better erase that paragraph from the record—after you memorize it.

What I had in mind was the fact that up to a certain point the operation of the beaver and the lumberman are identical. They both cut down small trees, float them down the river, put them through a shredding and digester process. In the pulp mill the wood is reduced to pulp and eventually emerges as paper. In the beaver the wood is reduced to pulp and eventually—Oh, well, let it go, let it go. Maybe it does become paper. If we accept that as a premise it should not be difficult to prove that if a beaver can make paper, he can go one step farther and write on it. The defense rests, yer Honor. P.S. How are you fixed for dough?

"There y'are," said Bill. "Half a yard of a letter about beavers and gremlins and one thing and another, when all he had in mind was the touch added with fine and nonchalant carelessness as a post script."

*Takes time out for a little snack*

"I trust his hard work was appreciated and his faith was rewarded—"

"Well," said Bill, "I'll tell you. The answer is yes and no. I wrote him a modest reply touching on some of the main characteristics of the little known Asiatic yak. Coming close to the bottom of the page I wrote that I had no room to discuss the merits—if any—of the postscript, outside the fact that I was happy to say I had enough of the stuff to bring me home healthy and happy and all in one piece at the end of the week.

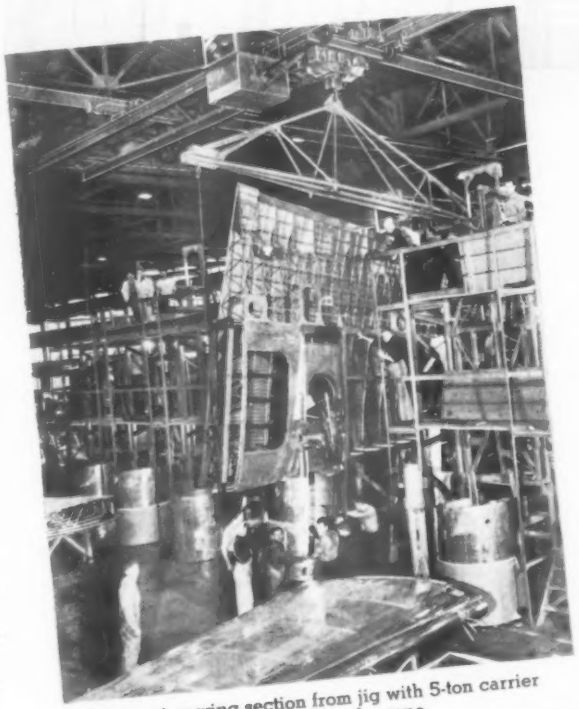
"Talking about vacations reminds me that my old friend Sam Hummell started on one recently that will last him the rest of his life. After 48 years toiling and moiling in the foundry, and believe me he was some toiler, he decided to get out while the getting was good and play around for a while. Among other things he planned a long leisurely tour to a few places he missed in his younger days when he hopped blithely from town to town just as the spirit moved him. This time he will travel on the cushions.

"Sam is going to enjoy a well earned rest and not the least source of pleasure will be the reflection that he has the good will and affection of hundreds of young men he trained to become skilled mechanics in the 31 years when he was the main guy in the Sterling Foundry, Wellington, O. He went in there as foreman in a little aluminum foundry and when he laid down the baton of office a few months ago the shop was turning out nearly 2000 tons of the slickest looking machine tool castings per month for a customer that will accept nothing less than absolute perfection inside and outside. After the castings are shaken out they are chipped and ground in the usual manner and then the surface is sand papered by hand until they are as smooth and shining as the top of a grand piano. For several years the castings rejected by the customer have amounted to 0.46 per cent. Yes Sir, less than half of one per cent.

"Sam was born on a farm near Johnstown, Pa., and as a sturdy young lad of 10 or 11 he helped to carry food and other supplies into the stricken city, practically wrecked May 31, 1889 when torrential rains broke the dam on Conemaugh Lake and sent a roaring wave through the valley that snuffed out the lives of over 2000 people and caused

(*Concluded on page* 135)

# MASSIVE LOADS TRAVEL ON *Overhead Railways!*



★ Removing wing section from jig with 5-ton carrier on multiple truck crane.

★ Up and Over handling of massive hull with Overhead Railway System.

THE problem of "up and over" movement of massive loads in the mammoth bomber plants now turning out Flying Fortresses and Liberators was solved by American MonoRail engineers.

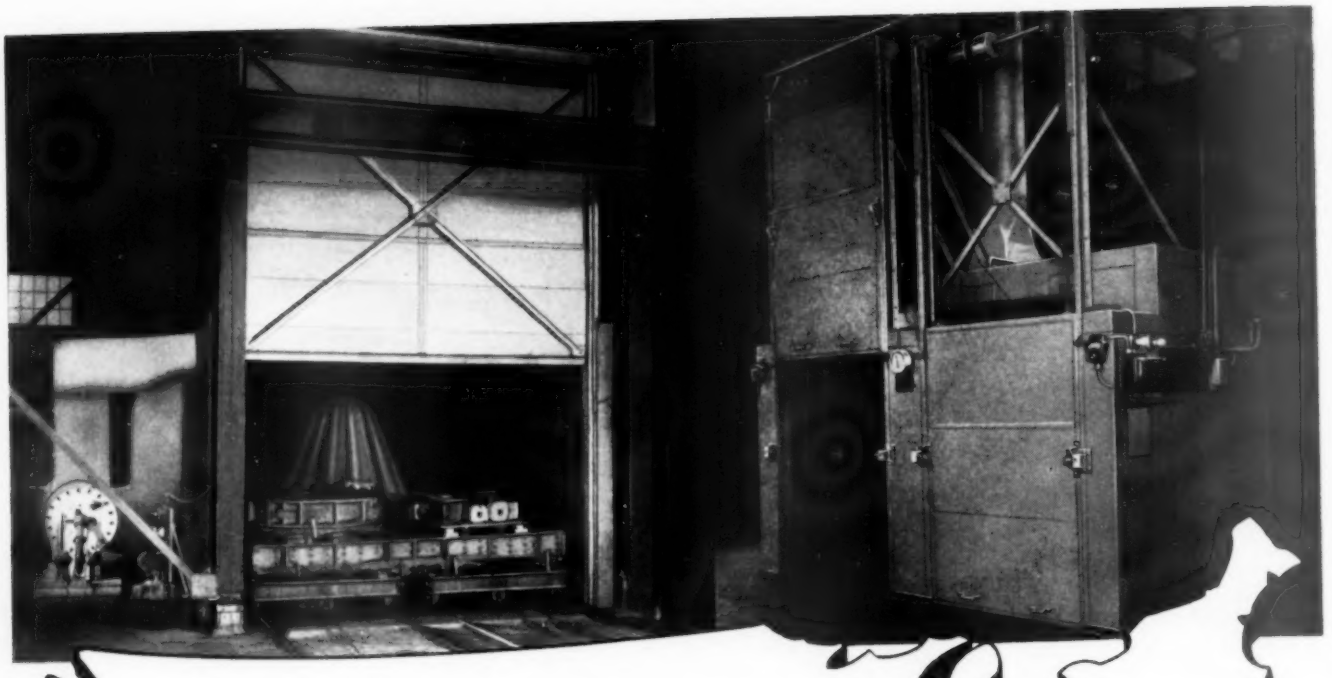
So efficient is the operation of these "Overhead Railways" that they have become standard equipment in the Boeing, Consolidated, Martin, Douglas and Ford bomber plants, in fact, wherever 4-motor bombers are built.

Nationally known architects who built these plants recognized early in their plans the advantage of calling upon American MonoRail engineers for highly specialized recommendations. This service is available in connection with war production now or for plant conversion in the future. Early consideration of handling problems often saves valuable time and needless building cost. Call your nearest American MonoRail representative or write us today.

**THE AMERICAN MONORAIL CO.**

13104 Athens Avenue — Cleveland 7, Ohio

★



# PROMISES FULFILLED

Not every satisfied customer makes the effort to voice his attitude which, after all, is human. Therefore comments like the following are significant.

"Our whole organization is sold on your service. The results are so satisfying that we are purchasing additional ovens from you."

"I never had seen such uniform cores. Bakes faster than expected, and gas consumption shows economy. Several callers have said these ovens are just what they need."

"Even better than we expected and large and small cores can be baked at the same time and anywhere in the oven with perfect results."

YB CO

**YOUNG**

**BROTHERS COMPANY**

*Industrial Ovens for all purposes*

**6508 MACK AVENUE**

**DETROIT, MICHIGAN**

**BRANCH OFFICES IN PRINCIPAL INDUSTRIAL CENTERS** • In California at: 277 Seventh St., San Francisco and 406 So. Main St., Los Angeles

(*Concluded from page* 132)

property damage of $10,000,000. It was the greatest single peace time disaster in the history of the United States and brought sympathy and assistance from all over the country.

"Funny thing," Bill remarked parenthetically, "how quickly and easily people forget. Even before the turn of the century a familiar sign conspicuously displayed in Nickelodeons and other popular places of amusement warned patrons: Do Not Spit on the Floor. Remember the Johnstown Flood. People in and around Johnstown have not forgotten. In addition to properly identified victims, Grand View cemetery contains the graves of nearly 800 bodies crushed and mangled beyond recognition.

"Wars, floods, fires, strikes and other disasters come and go by land and sea, but the common people have to plod along under the ancient curse of earning their bread in the sweat of their brow. As one of a family of ten, Sam was leaning his shoulder against the wheel before he was out of short pants, first in his own immediate neighborhood and later in Johnstown, by this time rebuilt and rejuvenated. Remuneration for his first job in a hardware store was at the rate of $8 per month, or as Sam found when he broke it down into 25 or 26 working days, approximately 32 cents per day. In those days stores were open from 7 a.m. to 10 or 11 p.m. and Sam found himself too deeply involved in fractions when he attempted to calculate the hourly rate.

"Although he was quite willing to commence at the bottom of the industrial ladder he figured that the bottom of this particular industrial ladder was so far under ground that he had little or no chance of reaching the top in the course of an ordinary life time. He tendered his resignation as and of Sat'day night and the following Monday went to work in a little printing shop where the remuneration was 42 cents per 10 hour day. On a daily basis this represented an increase of 30 per cent, but on an hourly basis it was nearly 100 per cent, enough to convince him that he was right in the groove leading to fame and fortune.

"By the time he was fairly proficient at setting type, feeding the hand press and pulling galley proofs he began to have doubts. Occasional overheard snatches of conversation between the boss and customers seemed to indicate that the printing business was not exactly an Eldorado. He heard that the proprietor of a small foundry needed an apprentice. He applied for and was given the position. 'You with me come,' the foundryman said, 'and a molder and caster I will ou' of you make.'

"Kinda quaint," Bill explained, "that Pennsylvania Dutch brogue until you get used to it."

"Indeed it is," I admitted. "With your gift for dialect you should be on the radio. So, Sam, Sam no longer ran. At last he became a foundry man. From here now on you can carry."

"See that! No trouble once you get the trick of it. Sam learned the trade the hard old fashioned way, based not so much on the employer's altruistic motive of giving the boy a thorough, all around training, as it was on the canny business principle of getting a man's work for a boy's wages. The arrangement suited Sam, by this time a strong, husky lad who could break pig iron and scrap and run it up a long incline on a wheelbarrow to the cupola charging floor without puffing or resting on the way to spit on his hands. He learned how to chip the cupola lining, apply the daubing as smooth as the inside of a robin's nest, ram the bottom, put in the kindling wood and coke, fill her up later with coke and iron, put on the wind and then come down and tap her out and bot her up. He also learned to cut over a sand pile, fit bars in flasks, make molds and cores, load the old dusty loose slat tumbling barrel, and chip castings. Before he was 21 he had passed tests in the branch of the service known as *government work*, including iron stands, picture frames, spiders, the caged ball, the four leg horse, the double arm pulley, the three link chain and the final masterpiece, the cup, saucer and spoon.

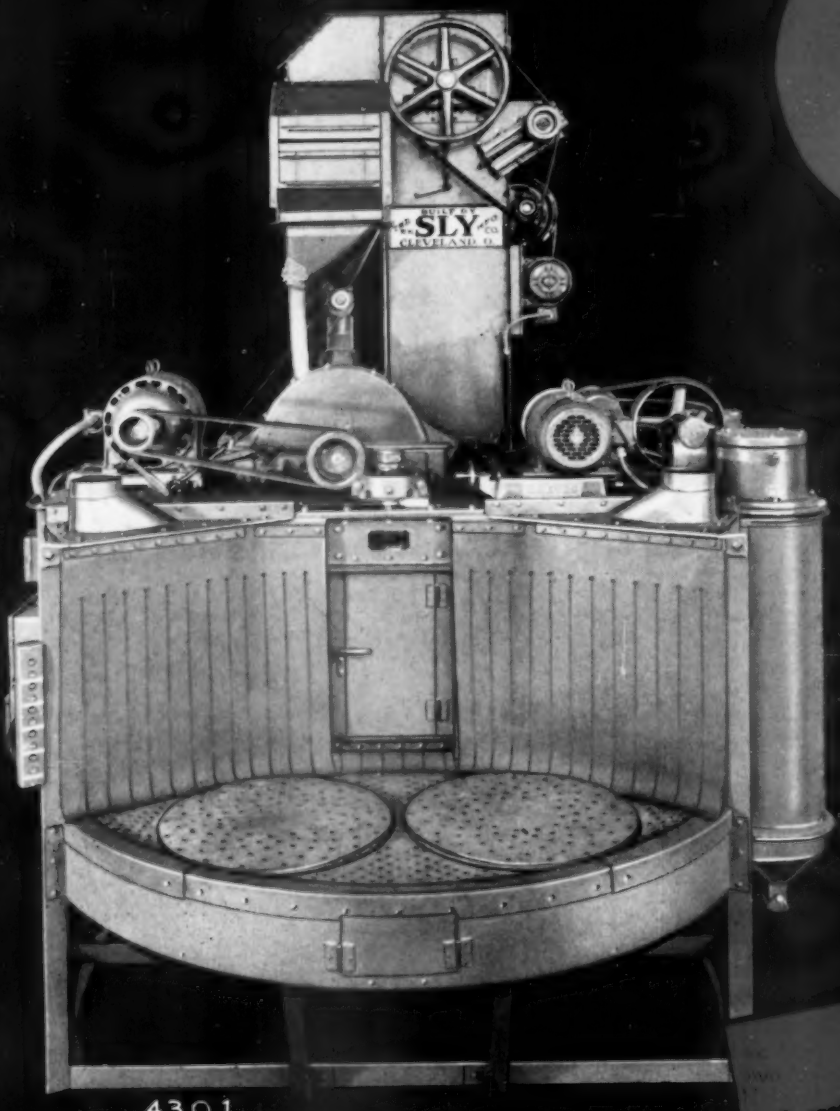
"Having exhausted the possibilities of the old Alma Mater, he decided to spread his wings, fly away, see the world and gain further experience in a business which he now realized had possibilities. His ambitious projected itinerary included a leisurely jaunt to the Pacific coast, down the west coast of South America, around Cape Horn, stops in Argentina and Brazil, and then a series of hops along the east coast of the United States. He has not made that trip—yet.

"However, the chances seem brighter now than they were when he first set his eyes and mind on the far horizon and dreamed of where he would go, what he would do and who and what he would see. Always a very observing lad he anticipated getting quite an eye and earful. Under present conditions his sorties, raids and onfalls will be confined to the continent of North America. According to the best available authority of explorers old and new there is quite a bit of territory between the Gulf of Mexico and the Arctic Circle, and between the Atlantic and Pacific oceans. He may fly east and he may fly west and he may fly over the cuckoo's nest, but it is a safe bet he eventually will fly to the town he loves the best, Wellington, Ohio.

"While working at his first stop in Lima, O., the shop burned down and he lost a fine kit of tools. A few years later the depression of 1903 made jobs scarce and far apart. His rambling feet carried him here and there all over the country and finally back to Ohio in 1912 to a job as foreman in the Sterling foundry. The night he landed in the town the foundry burned down, so he had a chance to start from scratch. Sam was some scratcher for a period of 31 years or until he retired recently. He is now in position to test the recipe of the large colored lady who said under somewhat similar circumstances: 'When Ah wo'ks, Ah wo'ks ha'd. When Ah sits, Ah sits loose, and when Ah sta'ts to wo"y, Ah goes to sleep!' "

*A warm welcome usually is appreciated, but like everything else it can be overdone*

# SLY




4301

• Cleans forgings and castings in a large variety of sizes and shapes.

## FEATURES

Rugged construction and simple design.
Diameter of revolving table—8 ft.
Effective load area—45 sq. ft.
Table speed—variable—from 1/2 to 1-1/5 r.p.m.
Maximum uniform load—150 lbs. per sq. ft.
Maximum work height—two sizes—15" or 29"
Overall dimensions—9' 9" wide x 18' 6" deep x 12' 4" (or 13' 6") high.

The six 30" dia. auxiliary tables each accommodate a maximum load of 1000 pounds.

## "Centri-Blast" WHEEL

(Patented)

The heart of the machine — a simple sturdy blasting wheel with four blades. It is mounted on a heavy shaft, equipped with roller bearings and V-belt drive—no moving parts inside of wheel. All parts in contact with abrasive are of highly wear resisting alloy. The abrasive feed spout controls the direction of the blast.

# "Centri-Blast" ROTARY TABLE

—AIRLESS—

## CLEANS LARGE TONNAGE AT SMALL COST

★ This new Sly "Centri-Blast" Rotary Table cleans forgings and castings in a fraction of the time formerly required with other blast cleaning methods. It has six 30-inch diameter auxiliary tables which revolve about a common axis.

These revolving tables carry the parts to be cleaned, through the blast chamber directly under the "Centri-Blast" airless wheel. They are cleaned by a terrific, *fast cleaning* blast created by centrifugal force entirely.

Results prove that this Sly Centri-Blast Rotary Table produces outstanding results in both quality and quantity at minimum cost.

*Ask for complete information.*

HELPFUL BULLETINS ON OTHER **SLY** CLEANING EQUIPMENT

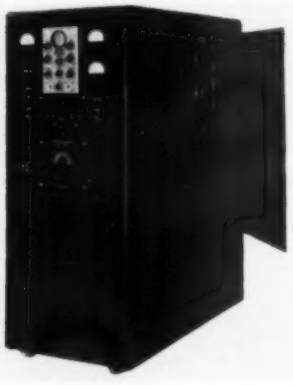
—YOURS UPON REQUEST

**THE W. W. SLY MFG. COMPANY**

4753 TRAIN AVENUE ★ CLEVELAND 2, OHIO

## Electrical Source Unit

Harry W. Dietert Co., Detroit, and its associate firm, Applied Research Laboratory, Glendale, Calif., announce a new electrical source unit for spectographic analysis. It is said to provide precisely controlled excitation suitable for all types of analysis, combining the sensitivity of the arc with the accuracy of the spark. The unit consists of a main control panel at the front and a selector panel at the side. Pull knobs on the latter allow selection of the discharge conditions. Seven knobs at the front of the condenser



section allow selection of capacitance values from 1 to 60 microfarads in steps of one microfarad. Ten knobs allow selection of resistance from 1 to 400 ohms, while five knobs on the inductance section allow value from 25 to 400 microhenries. An oscillograph on the main panel permits study of the current, duration and wave-form of an individual discharge. An ammeter and two voltmeters check current consumption and condenser and line voltages. Operating time is controlled by an adjustable synchronous timer. The unit is 63 inches high, 28 inches wide and 50 inches long.

## Air Tool Lubricator

Filters Inc. 1515 Gardena Avenue, Glendale, Calif., is offering an automatic lubricator for feeding a regulated oil mist into air tools, thereby eliminating need for frequent oiling of such equipment. The lubricator is installed 1 to 6 feet from the tool to prevent deterioration of rubber hose lines. Positive feeding action supplies oil only when the tool is operating, an automatic shut-off preventing any flooding. The oil reservoir holds enough oil for more than a week under normal usage.

## Electric Motors

General Electric Co., Schenectady, N. Y., announces a new line of direct-current vertical motors ranging from 40 to 200 horsepower at 1750 r.p.m. and in equivalent ratings at other speeds. Available in both constant and adjustable speed types, the motors are designed for low-thrust, solid-shaft applications on pumps, machine tools, and marine underdeck auxiliaries. They are of drip-proof, protected construction. A special bearing housing prevents grease from entering the motor. Two hand-hole covers permit easy inspection of the commutator and brushes.

## Laboratory Furnaces

Lindberg Engineering Co., 2444 West Hibbard street, Chicago 12, has developed a complete new line of laboratory furnaces. The line includes the box type shown in the accompanying illustration for drying precipitates, ash determinations, fusions, ignitions, etc.; the combustion type for carbon determination, standard combustion, organic analyses, etc.; crucible type for melting

base metals, thermocouple calibrations, molten salt baths, etc., and hot plates for heating, distilling, boiling, evaporating, etc. In many respects the new furnaces are patterned after the firm's production furnaces, and incorporate such features as convenient door operating mechanism on the box furnace, low-voltage high-temperature elements, input control for stepless apportioning of heat, and streamlined shape. Furnaces are available in different sizes for operation on 110 or 220-volt alternating or direct current.

## Hardness Tester

Clark Instrument Inc., Dearborn, Mich., announces an improved hardness tester, available in three models, for Rockwell testing. Various new features are said to contribute to accuracy of measurement and speed of operation.

Instrument is supplied with penetrators for testing on the "C" and "B" scales and most other standard Rockwell scales. Three anvils are included: standard 3½-inch anvil for large flat bearing surfaces; spot anvil for most standard size pieces and test blocks; and V anvil for testing round and cylindrical parts. These are in addition to two smaller V anvils that form part of the adjustable steady rest.

## Casting Machine

Centrifugal Casting Machine Co., Tulsa, Okla., announces a new model of vertical centrifugal casting machine for production of ferrous and nonferrous castings. It accommodates molds up to 24 inches in diameter and up to 12 inches in height. The machine is completely integrated on a single base and can be

(*Continued on page* 140)

5

BONDING CLAYS

All Different

There is *one right* bonding clay for each foundry job. ECP offers you five different products, which, with many combinations, assure you of the best results at the lowest cost:

DIXIE BOND. Strongest bonding clay in America. Highest green strength, highest flowability, moderate dry strength, easiest shake-out.

BLACK HILLS BENTONITE. Highest dry strength, highest resilience. High permeability, high green and dry strength.

REVIVO BOND. Highly refractory. Low initial cost, great durability; hence very economical.

BALANCED REVIVO. Extremely high dry and hot strength, moderate green strength.

REVIVO SUPER BOND. High green strength, very high flowability.

*Without obligation, take advantage of ECP's 18-year background to get the greatest bonding clay value for every dollar you spend.*

**EASTERN CLAY PRODUCTS, INC.**
EIFORT, OHIO

ECP

DIXIE BOND • BLACK HILLS BENTONITE • REVIVO BOND • REVIVO SUPER BOND • BALANCED REVIVO

*All* TYPES OF BONDING CLAYS

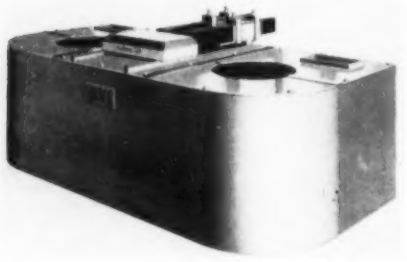
*A Foundry Sand Service Based Upon Practical Research*

(*Continued from page* 138)

moved as a unit; for permanent installation it may be bolted to the foundation through holes in the base. Speed of rotation can be adjusted by using the proper set of sheaves to suit the particular size of casting being produced. An adjustable guard protects workers from splattering metal. The machine is said to be ideal for permanent mold centrifugal casting of bushings with dimensions such that length of the bushing does not appreciably exceed the diameter. Small castings not suitable for permanent molds can be economically produced in dry sand molds.

## Heat Treating Unit

A. F. Holden Co., New Haven, Conn., has designed a 3-pot, high speed, heat treating unit for a variety of applications. The unit shown in the accompanying illustration consists of one pot with a temperature range from 1400 to 1800 degrees Fahr., a center pot with a tempera-



ture range from 1900 to 2350 degrees Fahr., and a third pot with a temperature range from 1000 to 1400 degrees. The first and third pots are removable and interchangeable, permitting several different baths to be used in the same unit. Advantages claimed for the unit are no scale at any temperature, material hardened with minimum dimensional change, uniformity of hardness and heating on thin and heavy sections, minimum distortion, etc.

## Safety Lamp Lock

Miller Co., Meriden, Conn., is incorporating a patented safety lamp lock in the socket of its new fluorescent fixtures. This device minimizes the risk of lamps falling from sockets but is arranged so as not to interfere with fixture relamping and cleaning.

## Magnetic Separator

Stearns Magnetic Mfg. Co., 662 South Twenty-Eighth Street, Milwaukee, has built a new type of magnetic separator designed to operate on the principle of the Ball-Norton underfeed lift method. A patented magnetic field is mounted above the lower surface of the separating belt. Mixed material is distributed in an even layer by an automatic feeder to the feeder belt which carries the material into the magnetic field. Alternating polarity of the field agitates the magnetically attracted portion of the material, releasing the entrained nonmagnetic particles which drop back to the feeder belt and move along to final delivery.

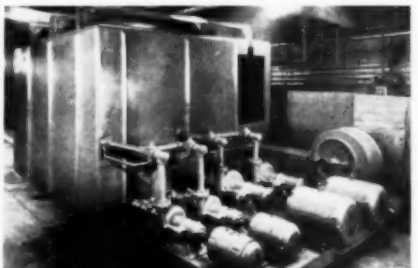
## Wire Sling

Macwhyte Co., Kenosha, Wis., has developed a wire rope sling that equalizes itself automatically when attached to

odd shaped objects where weight is not distributed evenly and where difficulty is experienced in getting a level lift. The sling shown in the accompanying illustration can be supplied in any desired length. The rope operates through a block suspended from the crane hook. The equalizing feature is a floating sheave or drum which exerts a braking action to arrest leg adjustment after the load is lifted. The sling may be used singly for a two-grip, or in pairs for a four-grip load.

## Core Plate Cleaner

Howard Engineering & Mfg. Co., 1060 Hulbert Street, Cincinnati, recently built a high pressure wash, rinse and blow-off machine, shown in the accompanying illustration. This core plate cleaning machine is 24 feet long, but is claimed to be the operating equivalent of a straight monorail washer approximately 60 feet long, due to the multi-pass design. Four centrifugal pumps, built by the American Manganese Steel Division of the American Brake Shoe Co. are shown on the base of the ma-



chine. The two smaller pumps, called the low pressure units, are coupled to 5-horsepower motors operating at 900 r.p.m. for handling 300 gallons per minute of core sand against a 20-foot head. The two larger pumps, called the high pressure units, are coupled to 50 horsepower 1800 r.p.m. motors and pump approximately 400 gallons per minute against 100 pounds pressure. The function of all of these pumps is to pump sand-laden water through 3/16-inch norbide nozzles.

Wide impeller clearance permits free passage of sand and debris-laden liquids and heavily charged slime, sludge and slurry. Tubular supports on the water end fit into sleeves cast integral with the bearing stand, simplifying assembly and disassembly and assuring proper alignment. The stuffing box is deep, amply providing against leakage, and is accessible by removing the cover cap when adjustment or repacking is needed. Four types of impellers are available for various conditions. Large size antifriction bearings, completely housed and sealed against leakage of lubricant and the entrance of dirt or liquid, are standard.

## Etching Kit

Jas. H. Matthews & Co., 3942 Forbes Street, Pittsburgh, has developed a new inspector's kit for use with the company's synthetic stamps and acid etching inks.

Kit is acid-proof and holds four stamps. Etching ink is kept in one bottle, oil or neutralizer in the other. Stamp pad in the drawer at the front is quickly pulled out for re-inking by means of a glass tube provided. In operation, the self-closing cover on top of the kit is tilted, the selected stamp is inked by touching the pad underneath and withdrawn, and the cover closes automatically to prevent escape of acid fumes. After the part has been marked, drop of oil or neutralizer from the second bottle is placed on the impression to neutralize the acid.

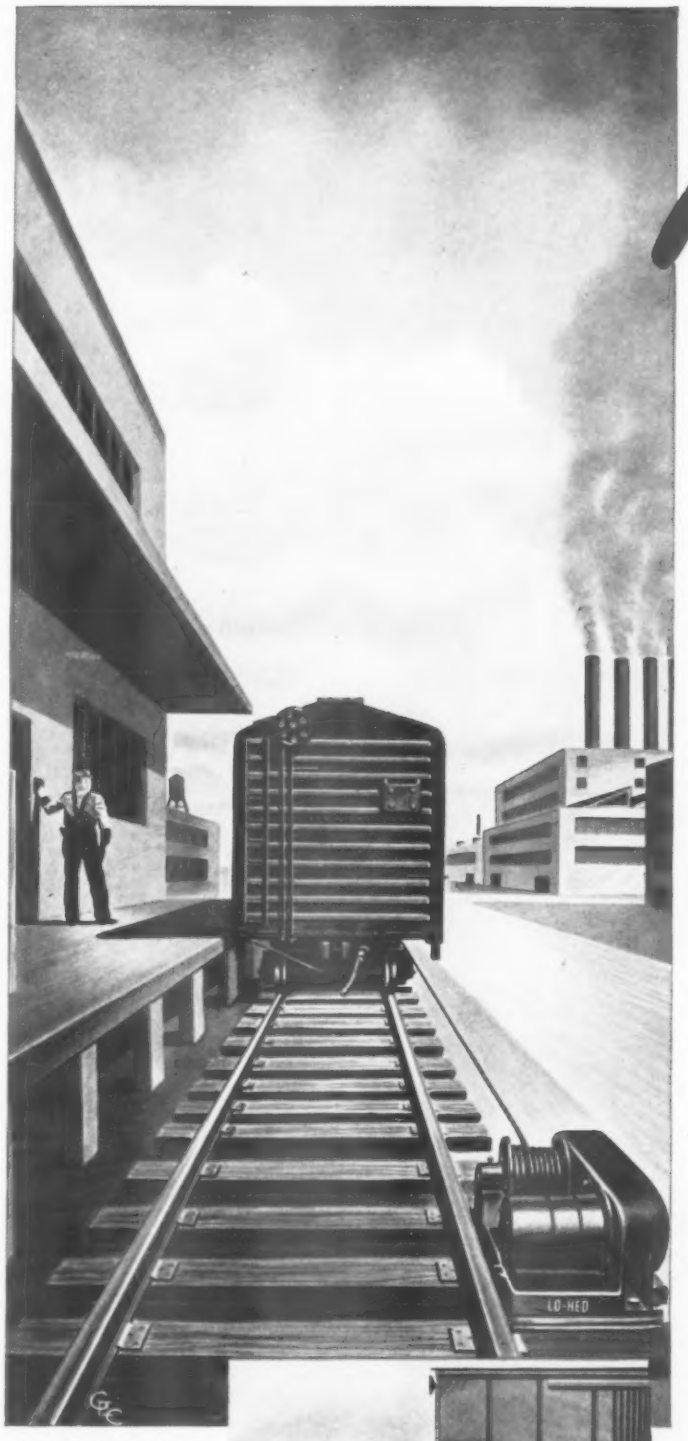
## Sweat Band

Aldine Paper Co., 373 Fourth Avenue, New York, is offering a sweat band made of a patented process insoluble material and a cellulose fibre filler. It fits any size head and may be rinsed, dried and reused.

## Crane Control

Cutler Hammer Inc., Milwaukee, has developed a new controller for the operation of electric cranes on alternating current. Its important feature is elimination of the mechanical load brake. A circuit arrangement changes the motor characteristics to conform to the load characteristics so as to accomplish the

(*Concluded on page* 142)



*Above: Lo-Hed Stationary Hoist doing car puller service. Operated from platform by remote control.*

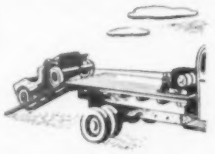
*Right: Old time and labor-wasting method of inching freight cars along siding.*

# I HAVE 101 USES

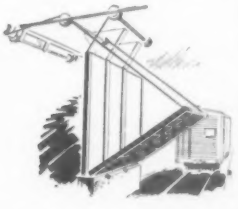
## Can I save you Time, Money and Manpower?

The Lo-Hed Stationary Hoist is the hoist-of-all-trades. There is hardly a plant that can't use one or more and for one or more purposes. You can bolt this hoist anywhere—to a floor or foundation; or move it from one job to another.

Its many uses include car puller service at plant sidings or freight yards, hoisting mine cars, handling spouts in steel mills, operating contractors' derricks, lifting heavy gates, furnace doors, vat covers, raising and lowering platforms, pulling loads up inclines and many others.



The Lo-Hed Stationary Hoist has a number of the same features you find in Lo-Hed Monorail Electric Hoists, such as an efficient straight line spur gear drive, heavy duty hoist motor, and heavy duty bearings and stub tooth gears operating in a sealed oil bath. Motor, controllers, and gearing are protected from dust and dirt by readily removable covers.



**CAPACITIES 500 to 4000 lbs.** Standard capacities are available from 500 to 4000 lbs. Holding or lowering brakes, push-button control, outboard winch head and other features can be supplied should the job require them.

*Write or telegraph for full information on a Lo-Hed Stationary Hoist to meet your requirements.*

**Other A-E-CO Products: Taylor Stokers**
**Marine Deck Auxiliaries • Hele-Shaw Fluid Power**

**Also, Lo-Hed "Balanced" Electric Hoists for all purposes which can be adapted for operation on any monorail system.**

**Look in your Classified Telephone Directory under "A-E-CO LO-HED HOISTS" for your nearest representative.**

AE CO 75th ANNIVERSARY

# AMERICAN ENGINEERING COMPANY

**2418 ARAMINGO AVENUE**
**PHILADELPHIA, PENNA.**

(*Concluded from page* 140)

same result as the use of a mechanical brake. Dynamic lowering is provided on all points, with five selective lowering speeds available. On empty hook lowering these speeds provide 10 to 90 per cent of full load hoisting speed and on full load lowering provide 40 to 150 per cent of full load hoisting speed.

## Feeding System

Mealpack Inc., 152 West Forty-Second Street, New York, announces a new system for in-plant feeding of war workers. The system is built around a container consisting of five earthenware food and beverage compartments, insulated within a pressed steel unit. Each compartment is sealed with snap-in paper covers. A menu for preordering the next day's meal is enclosed and the entire container sealed for delivery to the worker who has ordered the meal. The seal-lock, applied at the kitchen or caterers, carries the worker's shop number. When opened the lid becomes a lap tray

for holding the container. After the worker finishes his meal he selects his next day's choice, which simultaneously authorizes charging his account. He then reseals it in the container and puts it on the rack for collection and reuse. For the duration these containers are available only for use by essential war plants where new or supplementary in-plant feeding is advisable in connection with the Food Distribution Administration's nutrition-in-industry program.

## Painting Aid

Turco Products Inc., 6135 South Central Avenue, Los Angeles, is offering a liquid preparation for coating galvanized metal surfaces preparatory to painting. It is claimed to passivate the galvanized surface so as to prevent chipping or peeling of the paint. The action gives a roughened, dark-colored surface and forms an inactive film which will not become alkaline and which is resistant to corrosion.

## Clamps

Grand Specialties Co., 3103 West Grand Avenue, Chicago, announces three new lines of clamps. One type is designed for light, fast work and has an instantaneous trigger release equipped with teeth which, under spring tension, hold a firm ratchet grip on the screw. Swivel has a fibre face, and complete fibre jaws are available for work on softer metals. A heavy-duty clamp, shown in the illustration, is a two-handed, lever-operated unit for large heavy

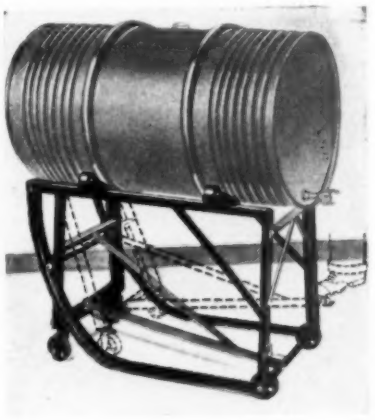
work. It is available in two sizes, the larger one having a 10½-inch opening. The third type, a standard "C" clamp designed for medium service where the extra weight of heavy duty clamps is not required, is made of alloy steel.

## Cup Machine

Coleman Foundry Equipment Co., Windsor Works, Stotfold, Beds., England, announces a small pneumatically operated machine for making runner and riser cups and bushings. A safety device prevents the machine from being operated except when the swinging head is engaged under the hook. Each machine is supplied with head suitable for round or rectangular cups, also sleeves and formers. Heads, sleeves, formers of varying sizes to suit customer's requirements also are available. The machine can be supplied with or without a wood bench. The machine is operated by a foot lever and does not require skilled labor. It is claimed a boy can be trained in a few minutes to turn out 11 or 12 bushes per minute.

## Safety Cradle

Industrial Products Co., 2820 North Fourth Street, Philadelphia 33, is offer-



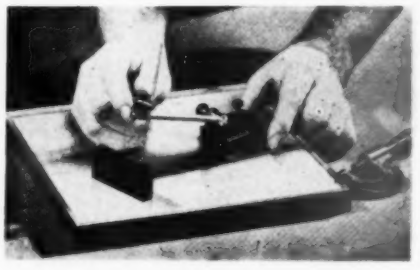
ing a cradle for safe and easy handling of drums and barrels. Rotating wheels at top of the frame place drums and barrels into position for removing part of liquid or for draining.

## Elevating Table

Lyon-Raymond Corp., Greene, N. Y., has incorporated various improvements in its hydraulic elevating table. The table has a capacity of 2000 pounds; the top is 30 inches square, having a lowered height of 29 inches and an elevated height of 43 inches. The standard stock table can be furnished with seven different optional features, including a floor lock, a spring balanced towing handle, a locking device which allows the table top to be turned and locked each 15 degrees, collapsible retaining bars for table sides, four swivel casters in place of the standard two swivel and two stationary casters, feet in place of casters, and a two-speed hydraulic foot pump instead of the single-speed pump.

## Surface Plate

Cadillac Glass Co., 900 West Cermak Road, Chicago, has perfected a new surface plate made of solid plate glass. As it wears, the glass shows only scratches



which do not burr nor affect accuracy, unless densely grouped. Resurfacing is unnecessary. In addition to their low cost, the plates do not require oiling or demagnetizing.

## Handle Wheel

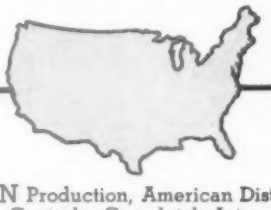
Gibbons Mfg. Co., 11 Gordon Street, Worcester 4, Mass., is offering a new safety handle wheel for all types of wood and metal working machines. It is especially recommended for machines where handle wheels or cranks are in rapid motion. A pin on the safety handle engages one of various holes near the circumference of the hand wheel when the handle is lifted. When released, a spring forces the handle out of position, dropping it to a point where it cannot engage the wheel if accidentally struck.

## Burring Tools

Carbur Inc., Lincoln Park 25, Mich., is introducing what are said to be the first cemented-carbide burring tools (rotary files) ever to be produced. Cutting teeth are ground from solid stock on special machines, and the heads are attached securely to the steel shanks. Tool life is said to be at least 50 times that of high speed steel burring tools. At present the tools are supplied only in ball-end types in ⅜ and ½-inch sizes but other sizes and shapes are under development.

Since every available ounce of Tungsten has been claimed for essential war use, and since the rule is that something else must be made to serve wherever possible, therefore very little could be helpfully said in recent months about the values of Tungsten. Yet Tungsten was never so important. We do well to remember that this standard alloying element has been withheld from some uses only because for other uses it is indispensable. And it is timely to note that the severest restrictions have now been a little relaxed. A better balance between need and supply has brought this about. When happily we all pass again from the economy of war to the economy of peace, unhampered use of Tungsten will be one of many advantages regained.

Inquiries concerning the availability or the metallurgical behavior of Tungsten, Molybdenum or Boron will be welcomed by the Molybdenum Corporation.



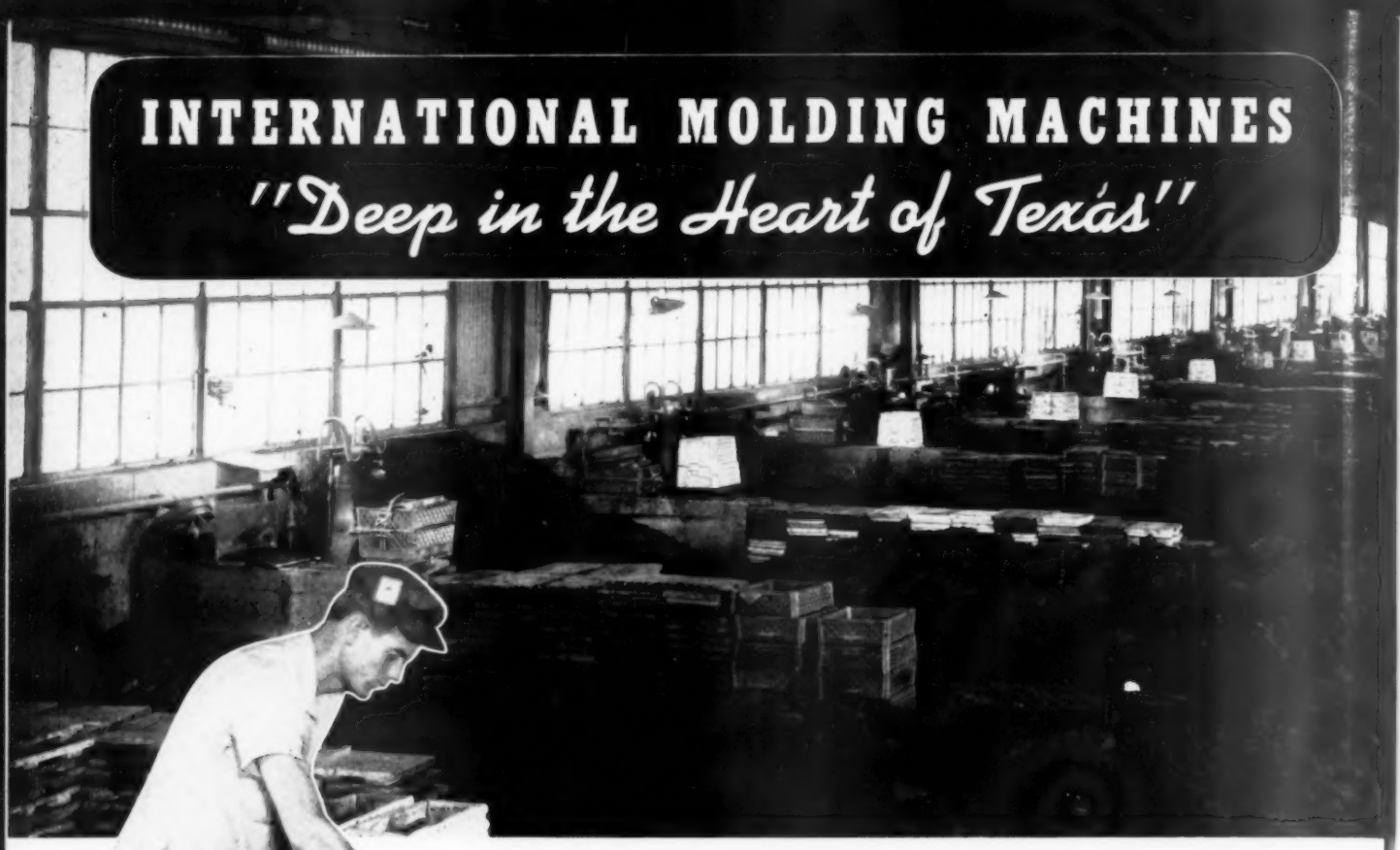
AMERICAN Production, American Distribution,
American Control—Completely Integrated.
Offices: Pittsburgh, New York, Chicago, Detroit, Los Angeles, San Francisco, Seattle.
Sales Representatives: Edgar L. Fink, Detroit; H. C. Donaldson & Co., Los Angeles, San Francisco, Seattle.

**MOLYBDENUM** CORPORATION OF AMERICA
GRANT BUILDING PITTSBURGH, PA.

MCA

# INTERNATIONAL MOLDING MACHINES

## *"Deep in the Heart of Texas"*



**Type PJS**
Jolt Squeezers

**Type G**
Jolt Ram,
Power Turnov
Foot Draw
Machine

**Type JDP**
Jolt Ram, Pow
Pin Lift Machi

**Speed up your shop - Increase the flow of Castings needed to build War Weapons by using**

***INTERNATIONALS***

**Meet your obligations to advance the date of VICTORY**

**A copy of our new KEY Catalog sent upon your request**

# INTERNATIONAL MOLDING MACHINE CO.

**2608-2624 W. 16th St., Chicago, Illinois**

## Cores Removed from Heavy Castings

Removal of large, heavily rodded cores from heavy castings generally is one that requires considerable labor and time, and several procedures have been developed to perform the work rapidly and economically. The most recent development to accomplish those results is a pneumatically driven machine or core breaker designed and perfected by the Cleveland Rock Drill Co., Cleveland, in close cooperation with engineers and foundry experts of the Fulton Foundry & Machine Co., Cleveland.

The machine in daily use in the Fulton foundry, as may be seen from the accompanying illustrations, comprises a

powerful pneumatic hammer mounted on wheels for ready mobility. The mounting is designed to permit the hammer to be raised or lowered quickly or swung from side to side. The hammer takes standard 1¼-inch round drill steels with detachable bits which may range from 4 to 16 feet or longer in length. The hammer itself is mounted on a slide with quick acting pneumatic feed which allows it to advance and retract a distance of approximately 4 feet.

Use of long drill rods enables the operators to stay out of range of dust and dirt that may arise. Such rods also permit cleaning of castings while they still are quite hot, and in some cases work can begin as much as a day sooner than when ordinary procedures are followed. Two men perform the work of operating the core breaker. One handles the drill while the other operates the raising and lowering mechanism and helps swing the drill back and forth as required.

A drill rod of the desired length is inserted in the hammer which is in the retracted position or at the far end of the slide. Then the machine is moved up to the casting until the point or bit of the drill just touches the face of the core, and the usual position of the machine is about on a line drawn through the center of the core. Chock blocks are placed under the two front wheels to prevent motion. The chock blocks are made from angle iron with a small tongue welded on one face. The tongue fits over the wheel rim and effectively stops any sliding. After the machine is in position the operator turns on the air which starts the hammer, and feeds the drill bit into the core by means of the control valve on the quick-acting pneumatic feed. That feed is not a continuous forward motion, but a rapid series of advances and retractions resulting from manipulation of the valve. As soon as the drill has been driven in to the desired length it is withdrawn, and quickly moved to another point by swinging or by raising or lowering, and the procedure repeated. The combination of ramming or feeding the drill, the hammering, and rotation of the drill results in rapid disintegration of the core.

Results obtained at Fulton Foundry & Machine Co. indicate that cores can be cleaned out of heavy castings in from one-half to one-eighth the time required by hand methods. For example long crane drum castings weighing from 12 to 14 tons and requiring the work of 4 men for 3 days to remove cores, were cleaned by 2 men in less than a day with the machine. Cylinder liner castings requiring an average of 3 hours core knockout time are cleaned in about 15 minutes. Marine cylinders weighing close to 12,000 pounds each formerly required 45 to 50 hours labor to remove the cores. With the new core breaker the time was reduced to 12 to 14 hours.

## Apprentice Program Is Described

Recently the Apprentice Training Service, Bureau of Training, WMC, Washington, published a 42-page bulletin entitled, "Apprenticeship Program of the Pattern Makers' Joint Apprenticeship Committee Chicago and Vicinity" which describes in detail the manifold problems in developing and putting into operation the Chicago apprenticeship program. It sets forth a clear picture of the care in selecting applicants, the training provided in shop and classroom, and thoroughness of periodic examinations before each period of advancement. To assure adequate facilities, certain limiting regulations with regard to hiring and retention of apprentices were formulated. To provide well rounded experience and training the committee sees that, where advisable, apprentices are transferred from one shop to another.

## Foundry Dedicates Honor Roll

The 218 former employes of Lebanon Steel Foundry, Lebanon, Pa., who left to join the armed forces were honored July 10 at ceremonies held at the plant to dedicate an honor roll. William H. Worrilow, president of the company, presided, and Gov. Edward Martin of Pennsylvania gave the principal address. War service records were presented to families of employes in the armed forces by Capt. Gilbert C. Hoover, U. S. N., and Maj. Gen. Leroy H. Watson presented gold star emblems to relatives of three men who have died in service.

## Foundry Engineering

Walter Giele Co., which recently opened an office in the First National Bank Building, Lebanon, Pa., offers an integrated engineering service to the foundry industry through its own and associated organizations. This service includes plans and specifications for foundry plants, design of special machinery and equipment for foundry use, appraisals, surveys and reports on existing or proposed foundry plants, and liquidation of surplus plants, buildings or equipment.

LaSalle Builders Supply Ltd., 139 Jean Talon St., West, Montreal, Quebec, recently has formed an industrial division to handle the sales of foundry supplies, refractories and specialties. E. F. Vincent, a director of the company, is in charge of the division.

## Air Brake Company Modernizes

# CLEANING DEPARTMENT

MODERNIZATION of the cleaning department at New York Air Brake Co., Watertown, N. Y., including installation of a special airless abrasive blast cleaning cabinet and two barrel type airless blast machines, was completed recently. All of this equipment was furnished by American Foundry Equipment Co., Mishawaka, Ind.

Several years ago, a barrel type machine of 11½ cubic feet capacity was installed for cleaning miscellaneous railroad castings of medium size weighing 10 to 70 pounds. Wartime demands and increased production prompted installation early in 1942 of another barrel type machine of larger capacity, and the special cleaning cabinet. The latter machine was installed primarily to clean air reservoir castings. These castings measure 19 inches high and 19 inches in diameter and weigh 120 pounds. Cleaning cost with the new equipment is reported to average 8.4 cents per casting, apportioned as follows: Labor 1.8 cents; abrasive 4.5 cents; power 0.6-cent, and maintenance 1.5 cents.

This machine also is used to clean 110-pound cylinder castings and 40-pound reservoir partition castings. Two airless blast units are utilized in the cabinet to assure thorough cleaning of the various sizes and shapes of castings handled.

Castings to be cleaned in the special cabinet are picked up in groups of five by a mono-rail electric hoist and deposited on a roller conveyor which feeds the loading hooks of the cabinet. The roller conveyor has a short section equipped with an air hoist that raises the castings into hooking position.

After the casting is hooked onto the conveyor, the conveyor moves one position, carrying the dirty castings toward the cabinet entrance and bringing a cleaned casting over the roller conveyor section for unhooking. Cleaned castings are moved down a roller conveyor which may be switched to feed any one of three processing tracks for inspection, gauging and chipping. Only one man is needed to operate the cabinet.

Careful cost records, not only in the cleaning department, but of all foundry operations are kept by New York Air Brake Co. A daily record of castings received from the foundry is kept by the cleaning room foreman. This record, entered on a form measuring 8½ x 11 inches, carries the casting piece number for every lot, the number of castings in the lot, the unit weight, and the scale weight for the lot.

When a load is brought to the cleaning machines, the operator of the machine enters each load on a daily report form. The entry for each load includes the piece number, the scale weight, the time elapsed in cleaning the load, and the actual wheel time, or time the work was under the abrasive blast. A place is also provided on the operator's daily report form to enter the amount and size of abrasive added to the machine during the day.

From these records, plus a time and material cost record for maintenance, the company conveniently keeps track of all cleaning costs by machine and by class of work.

An analysis of the records provides interesting comparisons of costs during different months of operation. Costs dropped, for example, as operators became familiar with the equipment, and were materially lower when production was high.

During the initial 5 months of the first machine's operation, for example, cleaning costs dropped from $2.22 a ton the first month to $1.04 a ton the fifth month. While there was some fluctuation in monthly volume and repair parts cost during this period, the economies were made possible by a steadily improved operating efficiency factor.

In the first month, May 1937, operating and maintenance labor costs to clean 467,170 pounds of iron and brass castings totaled $283.48, or $1.23 per ton of cleaned castings. During the fifth month, September, operating and maintenance labor cost to clean 378,856 pounds of castings totaled $113.96, or 60 cents per ton of cleaned castings. Labor costs, therefore, dropped in the fifth month to less than one-half of the cost during the first month.

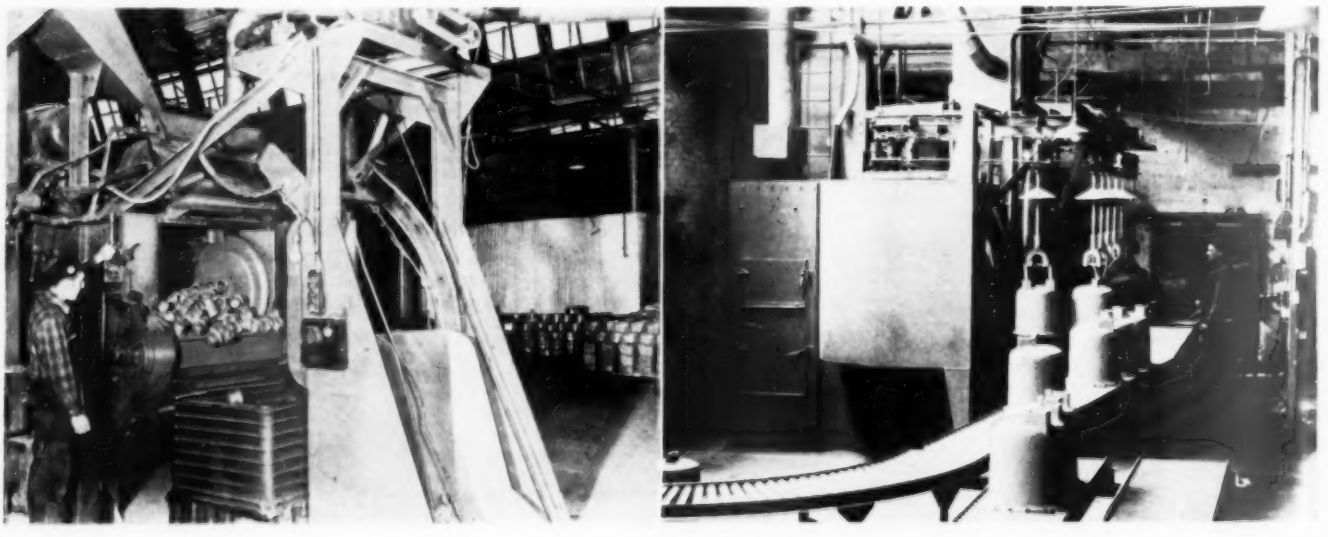
A further reflection of increased efficiency as operators became familiar with the equipment is the improved operating efficiency factor during this same period. This figure is determined by dividing the time the work was under the blast by the number of labor hours chargeable to the machine during the same period. Operating efficiency increased month by month from 25.5 per cent in May to 43.5 per cent in September.

Since the first machine has been supplemented by the larger unit and a special cabinet, castings have been divided between the two barrels with regard to the size of the pieces and their load weights, with the large fragile pieces going to the special machine.

---

A new research laboratory is being built by Ilg Electric Ventilating Co., Chicago. Of one-story, modern construction, it is being specially built to be shake-proof and to a considerable extent sound-proof. Equipment will include latest scientific instruments for measuring air, electricity, sound, light and vibration.

*(Left)—Barrel type airless blast machine for cleaning miscellaneous railroad castings. (Right)—Castings move over roller conveyor to special blast cleaning cabinet*



*A Book Every Foundryman Should Use*

# "ELEMENTARY FOUNDRY TECHNOLOGY"

*(REVISED, THIRD EDITION)*

★ Because today's foundry problems are not "run of the mill"—they require ingenuity—constant use of basic principles applied to new applications and practices. For the apprentice foundryman, this book is indispensable.

Fundamental data on both foundry practices and those related subjects of importance to foundrymen are thoroughly covered for use of apprentices and young men studying modern foundry operation and management.

This book contains material conforming to the requirements for instruction as set up in the minimum standards of four year foundry apprenticeship in the United States. It is sponsored by the National Founders Association, Chicago.

In addition to the completely new chapter on malleable cast iron foundry practice, the chapter on pig iron is revised to make it conversant with present day practice. Additional references are included.

Well over half of the book is devoted to discussion of fundamentals of foundry practice, with special reference to the field of gray iron and steel manufacture. Foundry subjects covered include . . . Elements of Iron . . . Iron Manufacture . . . The Cupola and Its Operation . . . Elementary Problems in Steel Foundry Production . . . Brass Melting . . . Foundry Sands . . . Gates and Risers . . . Molding Machines . . . Core Machines . . . Long Life Molds . . . Malleable cast iron foundry practice.

**ORDER YOUR COPIES TODAY**

**Every apprentice should have a copy of this instructive, well organized guide book . . . for convenience use the coupon**

THE FOUNDRY, Book Department,
1213 West Third Street, Cleveland, Ohio.

Send me, fully postpaid,.....copy(s) of "Elementary Foundry Technology" Third Edition, $3.00* for which there is enclosed $..... ☐ Check ☐ Money Order

Name:.....

Address:.....

City:..... State:.....

**Orders for delivery in Ohio must be accompanied by 12c additional for each book ordered, to take care of compulsory state sales tax.*

"Elementary Foundry Technology", by L. A. Hartley; Third Edition revised by Edwin Bremer and Pat Dwyer; 377 pages; 6 x 9 inches; 132 illustrations, 16 tables; includes glossary, index and bibliography; sponsored by the National Founders Association, Chicago: Price $3.00, postpaid; Published by The Penton Publishing Co., Cleveland.

# FOUNDRY DEVELOPMENTS
## *At short range*

FROM time to time a question arises on procedures for handling and disposing of cupola slag, and it might be pointed out that the important factors in any decision are the amount of slag, space available behind the cupola, and limitation on costs. Of the various methods used in foundries perhaps one of the simplest is the use of bottomless steel cylinders split vertically and bolted together. These are made of ¼-inch steel plate to form a cylinder about 2 feet or more in diameter and 3 feet high. One foundry uses three such cylinders arranged in triangular form. One is located at the end of the slag spout while the other two are placed one on each side of the spout, and nearer to the cupola. The spout is notched out on the sides above the latter cylinders. In operation, the cylinder at the end of the spout is filled first, and then a dam built just below the notches deflects the slag into one or both cylinders along the sides. After solidification, and usually at night, the cylinders are unbolted and the slag pulled out to a point where it can be loaded into a truck and hauled away to the dump.

♦ ♦ ♦

DIFFERENCE of opinion on procedures to obtain sound castings free from gas cavities and other thorns in the side of the foundryman is shown in two patents as far apart as the poles. One is No. 2,308,395 which proposes to place both mold and metal to be poured into a sealed chamber which is subjected to a vacuum. Then the metal is poured into the mold through an outside control. The other patent is No. 2,310,766 which uses a similar arrangement of chamber, metal and mold, except that pressure instead of vacuum is used. Both patents claim that their methods are efficacious in producing sound castings. Now some enterprising individual should combine the two—first using a vacuum to remove the gases, pouring the casting, and then subjecting the whole to pressure. Such combination is not new, and is used for impregnation processes such as creosoting telephone and other poles.

♦ ♦ ♦

EXCELLENT results have been obtained in an English malleable cast iron foundry producing blackheart malleable through use of spherically shaped blind risers which reduce the amount of metal required. To determine the proper size for the casting, varying sized spheres ranging from 1½ up to 5 inches in diameter in steps of ¼-inch are attached to sample or pilot castings which are broken up to determine the feeding effect. In some instances it was found necessary to increase the size by interposing a cylinder between the two hemispheres. To simplify procedure the feeder pattern is loose, and consists of a hemisphere at the bottom with a cylindrical block print above; the length of which carries it through the cope. The feeder pattern is withdrawn from the mold and a stop-off core to form the top half of the sphere is inserted in the print. All cores are made from a standard corebox, and are of the same length. The top of the core may be level with the top of the mold, project above it, or below it to vary the size of the riser.

♦ ♦ ♦

RECENT development which should be of interest to foundries contemplating construction of concrete driveways and outdoor storage yard floors is the use of a small amount of pine wood resin to eliminate surface scale caused by freezing, thawing and applications of salt for ice removal. Procedure was developed by chemists of Hercules Powder Co., and the amount of resin used is from 2½ to 4½ parts per 10,000 of portland cement. Resin is added by the cement manufacturer to the clinker during grinding.

♦ ♦ ♦

IN a paper presented at the annual meeting of the Institute of British Foundrymen held in June, L. W. Bolton and J. Hill in discussing production of manganese steel castings by the converter process mentioned results of an investigation on the effect of silicon, manganese and carbon on the blow. With a silicon range of 1.0 to 2.2 per cent and the manganese and carbon held constant at 0.8 and 3.0 per cent respectively, it was found that the time required for the blow increased with the silicon. The interesting fact was that while the time before appearance of the flame increased with silicon content, the blowing time after appearance of the flame varied very little and was generally 8 to 10 minutes. With a silicon content of 1.0 to 1.2 per cent the flame appeared almost instantly while with 1.6 to 1.8 per cent silicon from 4 to 6 minutes elapsed before the flame appeared. With the silicon and carbon held constant at 1.5 and 3.0 per cent respectively, and the manganese varied from 0.25 to 2.0 per cent it was found that manganese had no influence on the length of blow. When present in quantities over 1 per cent there was an appreciable increase in the fluidity of the slag and above 1.5 per cent the slag was extremely thin and was ejected in large quantities during the blow. With 1.5 per cent manganese present the sulphur was not higher than 0.07 per cent. Amount of carbon ranging from 2.7 to 3.3 per cent during the test had no appreciable effect on the length of the blow.

♦ ♦ ♦

COMPARATIVELY low melting point for magnesium and magnesium base alloys makes it difficult to make fluxes which will be liquid at the desired stage of melting so that they will serve their purpose efficaciously. Generally it is desired to have a flux that will have a melting point at or under 600 degrees Cent. (1110 degrees Fahr.). To meet that condition, and more particularly to produce a low melting point flux, patent No. 2,311,126 describes a procedure for preparing part of a suitable mixture. It consists in ball mill grinding a mixture of 107 parts ammonium chloride, 24 parts sodium chloride and 40 parts magnesium oxide. That material then is fused at 420 to 550 degrees Cent. (785 to 1020 degrees Fahr.) until ammonia ceases to be evolved. The fused material is cooled and ground. Actual flux used may consist of 42 parts fused material, 36 parts sodium chloride and 32 parts magnesium fluoride, or 67 parts fused material and 33 parts potassium chloride.

♦ ♦ ♦

CAST iron borings, at least in some quarters, have advanced from the scrap classification to that of a by-product. A recent report is that the Perfect Circle Co., Hagerstown, Ind., is selling "chemical borings" to one of the large chemical firms for use in manufacturing dyes for troop uniforms. The borings also are used to produce a chemical needed in reclaiming rubber, and they go directly into the production of smokeless powder and other explosives.

♦ ♦ ♦

ADDITIONS of columbium and of copper-beryllium to improve the physical properties of malleable cast iron, are described in two patents. Use of colum-

(*Concluded on page* 150)

# "IRONTON NOJOINT"
# *for Foundry Ladles*

## ESPECIALLY FOR RECEIVING, MIXING AND DESULPHURIZING LADLES

"Ironton Nojoint", plastic ramming refractory, gives much longer service than any other type of refractory, for lining receiving, mixing and desulphurizing ladles. This product gives a solid, dense, monolithic lining, consequently there can be no premature failure due to the corrosive action of soda ash. Fire brick linings fail on account of the action of alkaline slags on the brick joints.

"Ironton Nojoint" is quickly and easily installed. We offer you the assistance of a service man in installing your original lining and training your men to do the job properly.

*We have prepared a new bulletin on "Ironton Nojoint" which gives detailed instructions on just how to use it in ladle linings. A copy will be sent to you upon request.*

●

**ADDRESS BOX 109**

## THE IRONTON FIRE BRICK COMPANY

RELIABLE REFRACTORIES

IRONTON OHIO

(*Concluded from page* 148)

bium in amounts up to 0.5 per cent is cited in patent No. 2,310,666, but apparently 0.01 per cent is the preferred amount. Addition of 0.2 per cent beryllium in the form of 0.5 per cent of a copper-beryllium alloy containing 4 per cent beryllium is described in No. 2,310,667. Both additions were made to cupola malleable iron which was subjected to a quick anneal process. With columbium the elongation was increased without much change in tensile or yield point strengths while with beryllium all those properties increased.

♦ ♦ ♦

AT one time in the not so distant past many were interested in the so-called lost art of hardening copper in which the ancients were supposed to be quite proficient, and numerous processes, secret and otherwise, were developed to accomplish that object. Evidently some interest in that subject still holds for patent No. 2,311,083 was granted for a process of treating copper. While not for hardening it is closely allied to it since the aim is to toughen the copper and make it resistant to bending. Procedure is quite simple since all that has to be done is to boil the copper in an aqueous solution containing some 85 per cent magnesia cement, vinegar, potassium nitrate and in some cases potassium cyanide.

## Aluminum Castings Output Up

Wartime demands have resulted in the doubling of production of high strength heat treated aluminum castings during the past 18 months, according to a recent statement of the War Production Board. At the same time sand castings which have not been heat treated, the principal used prior to the war—have remained at the same production level.

The Aluminum and Magnesium Division of the WPB has issued complete figures on the shipments of castings by types for each month from January, 1942 through May, 1943. This is the first time that such statistics have been released.

Prior to the war, the bulk of demand for die castings was for the type made on gooseneck machines. Since the start of the war the use of castings made on high-pressure cold chamber machines for aircraft and ordnance uses has grown to the point where these constitute over 80 per cent of total shipments. Foundries and die-casting plants can compare their own growth in business with the overall trends shown in the accompanying table, data for which was made available through the co-operation of over 1000 foundries filing monthly reports with WPB.

## Will Study Electric Steel Production

Operators and metallurgists from most of the casting and ingot plants of the country will meet at Pittsburgh on Friday and Saturday, Oct. 1 and 2 to participate in the first annual conference of the Electric Steel Committee, Iron and Steel Division, American Institute of Mining and Metallurgical Engineers. Meeting will be held at Hotel William Penn. Electric Metal Makers Guild Inc., which has several representatives on the committee, is co-operating, and a number of its members will act as discussion leaders at technical sessions.

An attractive program with outstanding authorities from industry and WPB has been arranged under the leadership of Charles W. Briggs, Steel Founders' Society of America, and chairman of the conference committee, and Harry W. McQuaid, Republic Steel Corp., and chairman of the executive committee. On Friday, Oct. 1, the acid and basic groups will meet jointly morning and afternoon to discuss present status of the electric furnace steel industry, design and maintenance of furnaces and raw materials used including electrodes, refractories, scrap and alloying agents. In an evening session a talk will be presented by a leader of the electric furnace steel industry, and will be preceded by a motion picture showing recent operating practice.

On Saturday, Oct. 2, separate sessions will be held on basic and acid furnace practice. The morning will be devoted to the many problems connected with melting and oxidizing while the afternoon program will relate to refining, deoxidizing and finishing heats. The tentative program follows:

**Friday, Oct. 1**

10:00 a.m. to 12:30 p.m.—Urban Room
Joint session—Basic and Acid
Opening remarks—Charles W. Briggs, general chairman, Conference Committee. Object of Electric Furnace Steel Committee and Its Annual Conference—
Harry W. McQuaid, general chairman, Executive Committee.
Development and Present Status of the Electric Furnace Steel Industry.
Design of Electric Furnaces.
Brief historical resume.
Modern arc furnace; mechanical and electrical design.
Modern induction furnace.
Hydraulic designs.
Maintenance.
2:00 to 5:00 p.m.—Urban Room
Joint Session—Basic and Acid
Refractories.
Brief historical resume.
Recent developments and trends.
Water cooling.
Maintenance.
Electrodes.
Brief historical resume.
Recent developments and trends.
Raw materials.
Scrap; supply, preparation, segregation and classification, types making up charge.
Slag making materials; trends, sources.
Oxidizing materials.
Alloys; brief historical resume and trends.
Preliminary chemical analyses (optional).
8:00 p.m.—Urban Room
Joint Session—Basic and Acid
Forty-five minute talk by leader of the industry or WPB.
Forty minute motion picture.

**Saturday, Oct. 2**

9:30 a.m. to 12:30 p.m.—Urban Room
Basic Session
Melting and Oxidizing.
Brief historical resume.
Recent developments—ingots.
Recent developments—castings.
Melt-down temperatures.
Loss of alloys.
9:30 a.m. to 12:30 p.m.—Cardinal Room
Acid Session
Melting and Oxidizing.
Review and summary of present practice.
Characteristics of the boil.
Use and addition of oxidizing agents.
Oxidizing slags.
Loss of alloys by oxidation.
Stopping the boil.
2:00 to 5:00 p.m.—Urban Room
Basic Session
Deoxidizing.
Brief historical resume.

(*Concluded on page* 153)

## War Time Production of Aluminum Castings

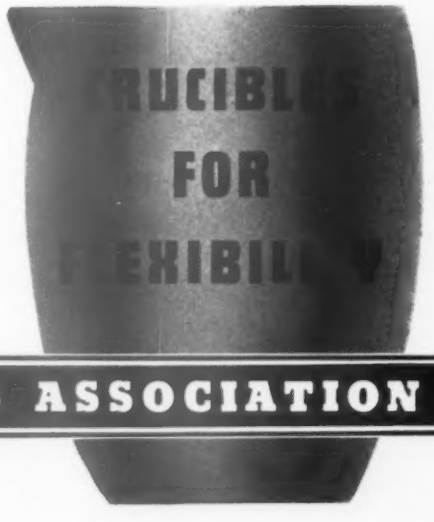
| Month | Total Castings | Sand Castings | | | | Permanent Mold Castings | | | Die Castings | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total | Cylinder Heads | Other Heat-Treated | Non Heat-Treated | Total | Heat-Treated | Non Heat-Treated | Total | Cold Chamber | Gooseneck |
| 1942—Jan. | 19 953 | 12.460 | * | 8.129 | 4 331 | 3,899 | 3,583 | 316 | 3.594 | † | † |
| Feb. | 19.711 | 11.883 | * | 7 828 | 4.055 | 3,863 | 3,557 | 306 | 3,965 | † | † |
| March | 23 275 | 13.729 | * | 9.145 | 4 584 | 4.385 | 4.016 | 369 | 5.161 | † | † |
| April | 24 864 | 15.227 | * | 10 393 | 4.834 | 4,483 | 4,041 | 442 | 5,154 | † | † |
| May | 24.010 | 15.612 | * | 10.940 | 4,672 | 4,429 | 3,909 | 520 | 3,969 | † | † |
| June | 25.425 | 16 525 | * | 11.728 | 4.797 | 4,768 | 4,148 | 620 | 4.132 | † | † |
| July | 26 943 | 17.887 | 4.730 | 8 207 | 5 260 | 4.545 | 4,070 | 475 | 4.511 | † | † |
| Aug. | 29 100 | 19.302 | 5.993 | 7.987 | 5.102 | 5,052 | 4.604 | 448 | 4,746 | † | † |
| Sept. | 30,625 | 19.715 | 6.349 | 8.518 | 4.848 | 5.994 | 5 432 | 562 | 4 916 | † | † |
| Oct. | 33,764 | 21,830 | 7,357 | 9.062 | 5.411 | 6,480 | 5,841 | 639 | 5,454 | 4,418 | 1,036 |
| Nov. | 32.354 | 21,130 | 7,465 | 8 907 | 4.758 | 6,286 | 5.713 | 573 | 4,938 | 4,049 | 889 |
| Dec. | 34.051 | 22,188 | 8,403 | 9.074 | 4.711 | 6.479 | 5.865 | 614 | 5 384 | 4,473 | 911 |
| 1942—Total | 324,075 | 207,488 | † | 150,125‡ | 57 363 | 60,663 | 54,779 | 5,884 | 55.924 | † | † |
| 1943—Jan. | 33,084 | 21,875 | 8,875 | 9,032 | 3.968 | 6,406 | 5,808 | 598 | 4,803 | 4,036 | 767 |
| Feb. | 33.502 | 22,162 | 9,039 | 9.111 | 4.012 | 6.516 | 5.950 | 566 | 4,824 | 3,944 | 880 |
| March | 38.735 | 25 309 | 10,974 | 9 997 | 4.338 | 7.949 | 7,268 | 680 | 5,477 | 4,519 | 958 |
| April | 37,065 | 24,296 | 9,963 | 9,973 | 4,360 | 7,586 | 6.919 | 667 | 5,183 | 4 301 | 882 |
| May | 37,815 | 25,104 | 10,548 | 10,032 | 4,524 | 7,667 | 6,988 | 679 | 5,044 | 4,157 | 887 |

†Not available.
*Separate data for cylinder heads not available; included under "Other heat-treated sand castings."
‡Total, all heat-treated sand castings, including cylinder heads.

# MELTING NONFERROUS METAL FOR WAR PRODUCTION . . .

Crucibles made with graphite are being authorized for use for all war connected foundry purposes (crucible grade graphite isn't needed for anything else). Use crucibles for melting aluminum in your foundry; cut melting time in half and eliminate the danger of iron pick up. Use crucibles for carrying and pouring all nonferrous metals in the foundry. They don't have to be made up and they pour clean metal. Crucible furnaces are considered the best nonferrous melting medium because they are adaptable and flexible as to fuels and alloys.

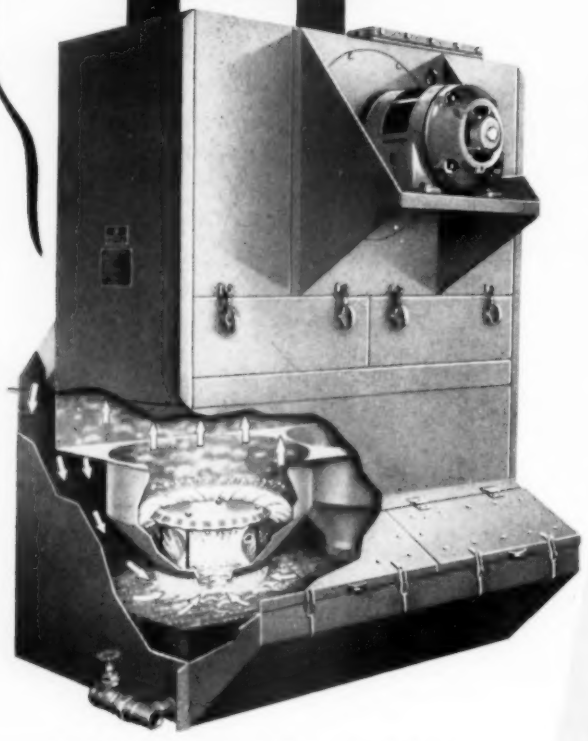
*For information and data write to the address below.*




**CRUCIBLE MANUFACTURERS ASSOCIATION**

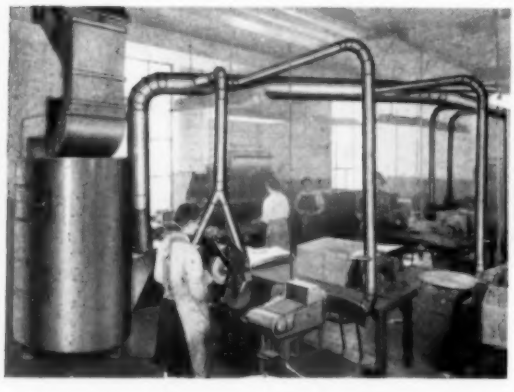
**90 WEST STREET, NEW YORK, N. Y.**

# 14 OF THE REASONS WHY *Uni-Wash* Will Meet Your Dust-Collecting Requirements



Newcomb-Detroit Uni-Wash Dust Collectors are designed to not only provide the most efficient methods of dust removal but offer many practical, simple features of operation and construction. A number of the Uni-Wash points of superiority are listed here.

Built to meet your requirements are Uni-Wash Dust Collectors in two size ranges. The "Senior" models of the type shown above are built in 5000 to greater than 20,000 C. F. M. capacities. The "Junior" series are supplied in 500 to 2500 C. F. M. capacities. A typical installation of the "Junior" Uni-Wash is shown below.



1. No bags, screens or filters to be removed and to clog and reduce efficiency of machine.
2. Converts dust into wet sludge which cannot burn or explode.
3. No dust escapes when unit is being cleaned.
4. Dust count shows more complete arresting of dust particles.
5. No water pump to wear and clog.
6. No spray nozzles or piping to clean and maintain.
7. No moving parts or agitators in the washing process.
8. No chemicals, oils or soaps to add for cleaning agents.
9. Only one standard ball bearing motor and drive. (Most models direct connected.)
10. The washed air is cleaner, having passed through two curtains of water.
11. Choice of horizontal or vertical inlet.
12. Water replenished only for evaporation and when unit is cleaned.
13. Very small floor space needed.
14. Sludge may be removed through accessible compartment.

## NEWCOMB-DETROIT COMPANY

5751 RUSSELL STREET — *Established 1912* — DETROIT, MICHIGAN

Dust Collectors • Paint Spray Booths • Drying Ovens • Metal Parts Washers and Rust Proofing Systems • Exhaust and Ventilating Systems • Carburizing Systems • Other Sheet Metal Equipment

(*Concluded from page* 150)

Recent developments in slagging off.
Cleaning up the heat.
Standardization of practice.
Slag; composition and chemistry.

2:00 to 5:00 p.m.—Cardinal Room
Acid Session

Refining and deoxidizing.
Review and summary of present practice.
Standardization of refining and deoxidation.
Control of silicon reduction.
Refining slags and their control.

FeO in slags and metal.
Alloy recovery.
Use of calcium deoxidizers.
Deoxidation with aluminum.
Inclusion types resulting from deoxidation.
High temperature metal; precautions and requirements.

## Manganese Bronze Melting

(*Concluded from page* 106)

will yield different physical properties under like tests. Consequently, every effort must be made to control the ratio of the ingredients of these bronzes so as to produce continually the desired formula within reasonable limits of the proportions desired.

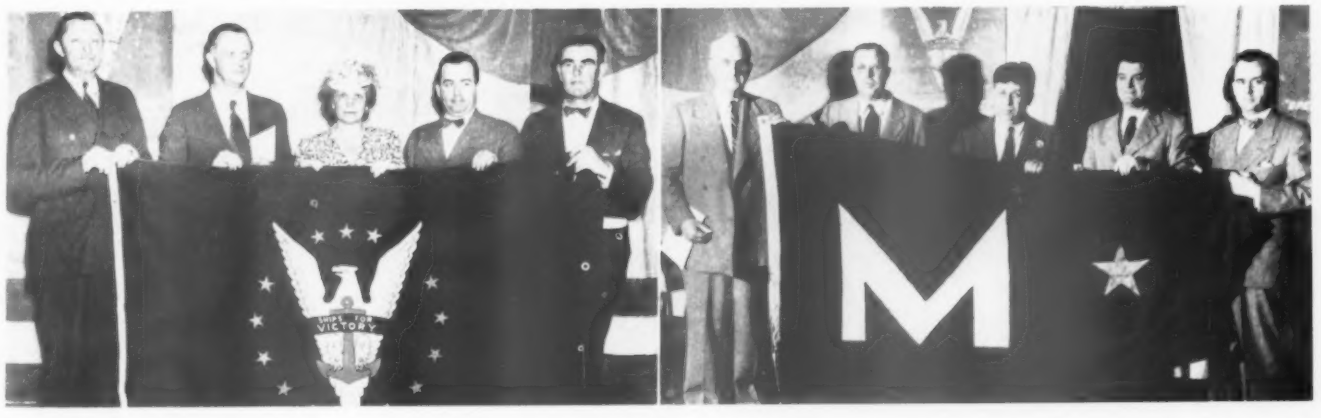
Therefore, it is recommended that whatever method is adopted to insure accuracy of formula, it should be studied carefully with relation to the fracture of metal that is of known composition. It is exceedingly desirable that anyone having to do with the control of these bronzes, should make it his business to study a series of fractures covering the different compositions of these bronzes under standard conditions and thereby learn the appearance of the fracture for a given composition. All other conditions, such as cooling rate, pouring temperature, and so on, are held as nearly standard as possible so that the only thing that is varied in these sample tests to be fractured is that of the chemical content of the different ingredients. It is because of the necessity for this accurate control that so many of the beginners in making manganese bronze castings find it difficult to have their test bars accepted by the government inspectors. Likewise, it is because of this accurate control that those who are experienced in the making of manganese bronze castings find so little difficulty in satisfying government requirements, and are so sure that manganese bronze is one of the simplest alloys to handle regularly produced in the brass foundry.

Some compositions of the manganese bronze family are much more difficult to control accurately in the melting process than others because the fracture test is not as sensitive of the change of chemical formula as is the case with some of the other compositions; but a standardization of practice and careful check by the laboratory with the shop control will definitely enable the shop to produce a standardized product. If the product is accurately standardized so that the formula is maintained as closely as manufacturing conditions will permit, sound, clean, strong, specifications-satisfying castings will result and minimum rejection is assured.

No crude method testing for the ratio of the ingredients of these bronzes can be substituted for an accurate laboratory control. Regular chemical analysis by competent chemists should be made at frequent periods so as to see that standards are being maintained and that the operators are not becoming careless or are losing ability to read the fractures correctly through too much familiarity. Since some of these compositions do not indicate the change in chemical formula as quickly in the fracture as others, it follows it must be more carefully done as one works with the bronzes that are not controlled as easily. Therefore, laboratory tests made regularly will help materially in uncovering errors in judgment that might otherwise cause a series of expensive rejections.

*Indianapolis works of National Malleable & Steel Castings Co. received the Army-Navy "E" award on June 25. Shown on the speakers' platform are, left to right: Gov. Henry F. Schricker of Indiana; S. C. Wasson, then manager of the Indianapolis works and now manager of the company's works at Cicero and Melrose Park, Ill.; and C. H. McCrea, president of National Malleable & Steel Catsings Co., acting as master of ceremonies*

## Lynchburg Foundry Co. Honored by Maritime Commission




*In recognition of outstanding production, the United States Maritime Commission presented its "M" pennant, Victory Fleet flag and merit badges to Lynchburg Foundry Co., Lynchburg, Va. Ceremonies were held at Lynchburg on July 9 and at Radford, Va., on July 10. Shown holding the "M" pennant are, left to right: Congressman C. A. Woodrum; R. S. Doucer, plant manager at Radford; Max Kuniansky, vice president and general manager; Macon Miller, former plant manager; Charles E. Walsh Jr., director of procurement, U. S. Maritime Commission. Holding the Victory Fleet flag are: United States Judge A. D. Barksdale; Gov. Colgate W. Darden Jr. of Virginia; Mrs. Archie A. Vandergrift; Mr. Walsh; Henry E. McWane, president*

## Guide Activities of West Coast Foundry

*Three officials of Enterprise Engine & Foundry Co., San Francisco, are, left to right: Ed Dickman, newly appointed foundry sales manager; Charles Hoehn Jr. now manager of the foundry division, and Fred T. Williams, recently made plant manager of the South San Francisco foundry. Mr. Dickman, associated with Enterprise for 25 years, served as foundry foreman for 10 years. Mr. Hoehn has been with the company for 15 years, learned the molding trade during school vacations, and was head of the sales force from 1940 until early this year. Mr. Williams joined the company as an apprentice pattern maker in 1907, served 21 months overseas during the last war and has had broad experience in both the production and sales departments*

## Offers New Casting Specifications

Procurement Division, Treasury Department, Washington, has announced that Federal Specifications QQ-B-621 Amendment 3 (commercial and naval brass castings) and QQ-B-726b Amendment 2 (manganese bronze castings, including manganese-aluminum bronze) are available in printed form from the Superintendent of Documents, Government Printing Office, Washington, price 5 cents each. The amendments became effective Aug. 15.

## Sees More Building By Industry

Despite the tremendous war-plant construction program of the past three years and despite the anticipated surplus-plant problem of the postwar era, F. W. Dodge Corp. anticipates a larger volume of industrial plant construction during the 10 years following the war than in the 1930-1939 decade. The estimated increase of the postwar decade over the pre-war decade is about 30 per cent, in terms of 1940 dollars.

Expectation of postwar demand is based upon the currently accumulating deferred demand for new plant capacity in unexpanded civilian-goods industries: food products, paper and pulp, printing and publishing, stone, glass clay products, textiles, refrigerators and cold storage, lumber and woodworking, leather and leather-working, railroad shops, etc.

In spite of greatly increased demands for their products, this group of non-war industries has shown a declining volume of new plant construction since October, 1941, when first restrictions were placed upon non-essential civilian construction of all kinds; the decline from 1941 to 1942 was 31 per cent. In peacetime, through prosperity and depressions, this non-war industry group invests 50 per cent more annually in new plant facilities than does the war industry group.

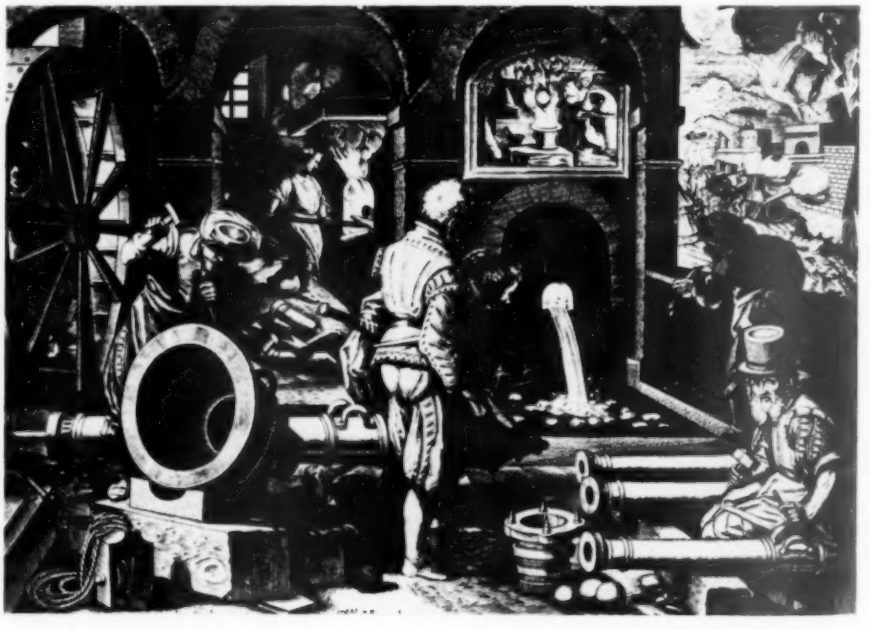
Analysis of the war-plant construction of 1941, 1942 and 1943 indicated that about three-eighths of the total, measured in dollar value, represents new capacity for chemicals and allied products (exclusive of ammunition and explosives), petroleum refining, iron and steel, nonferrous metals and their products, etc. According to the U. S. Department of Commerce, the expanded facilities in these categories are not necessarily beyond peacetime requirements.

The other five-eighths of the war-plant program consists of facilities for aircraft, aircraft engines, parts and accessories, ship construction and repair, ammunition, shells, bombs, explosives, ammunition loading and assembling, military combat vehicles, etc.; the expanded facilities of this group are stated by the Department of Commerce to be clearly beyond peacetime requirements.

## Book Review

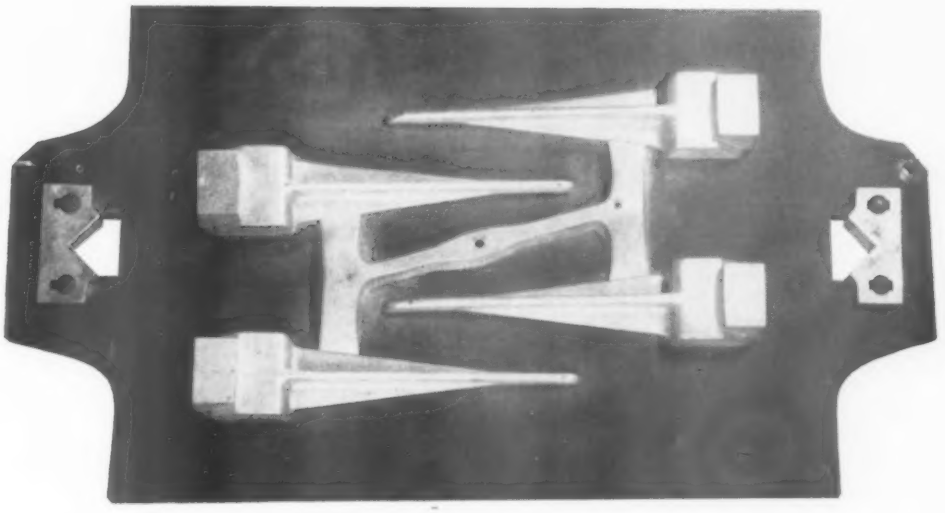
*Synthetic Adhesives*, by Paul I. Smith, fabrikoid, 125 pages, 5½ x 8½ inches, published by Chemical Publishing Co. Inc., Brooklyn, N. Y., price $3.

Designed primarily as a practical introduction to the subject of synthetic adhesives, this book provides descriptions of the main types with information on their properties and main applications. Different types are covered in separate chapters of which the first deals with dry glue film, phenol-formaldehyde resin, and the second with phenol-formaldehyde liquid and solid glues. Urea-formaldehyde glues, cellulose adhesives and polyvinyl cements are described in the next three chapters. The next three chapters discuss acrylic resin cements, chlorinated rubber and synthetic rubber cements, and miscellaneous adhesives. Final section is concerned with use of synthetic adhesives in manufacture of plywood and high density woods, and general applications in industry.



*Presented by the Engineers Club and reproduced through the courtesy of Bernard Collitt, Montreal, a large framed portrait of this rare engraving hangs on the lobby wall of the Cincinnati Milling Machine Co., new foundry. Designed by Joannes Stradanus and engraved by Phillippus Gallaeus, the picture was published at Antwerp, Belgium about* 1600 A. D.

# LIGNOLITE
## PATTERN PLATES



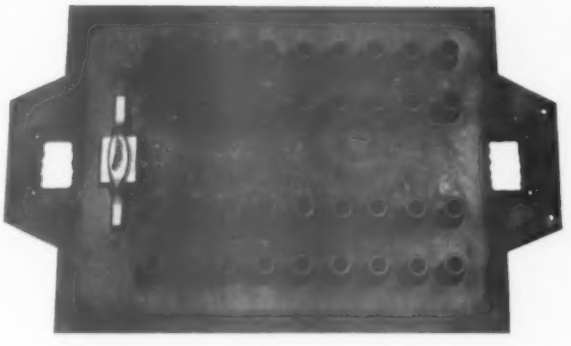
- FLAT
- UNIFORM CALIPER
- LIGHT WEIGHT
- HIGH STRENGTH
- EASILY MACHINED
- MOISTURE RESISTANT

CARRIED IN STOCK AND DISTRIBUTED BY

**ADAMS & NELSON COMPANY**
4125 Fullerton Avenue, Chicago, Illinois
**BARADA & PAGE, INC.**
2812 Center Street, Houston, Texas
**M. A. BELL COMPANY**
217 Lombard Street, St. Louis, Missouri
**COMBINED SUPPLY & EQUIPMENT CO., INC.**
215 Chandler Street, Buffalo, N. Y.
**FREEMAN SUPPLY CO.**
1152 E. Broadway, Toledo, Ohio
**E. R. FROST COMPANY, INC.**
1406 Quincy Street, Minneapolis, Minn.
**GRANT & COMPANY**
2144 E. 7th Street, Los Angeles, Calif.
**GEORGE F. PETTINOS, INC.**
1206 Locust Street, Philadelphia, Pa.
**PRODUCTS ENGINEERING COMPANY**
319 East Clybourn St., Milwaukee, Wisc.
**WATERSTON'S**
28 East Larned Street, Detroit, Mich.
**WESTERN FOUNDRY SAND CO.**
1039 Elliott Avenue, West Seattle, Wash.
*In Canada:*
**GEORGE F. PETTINOS, (CANADA) LTD.**
42 James Street, South Hamilton, Ont.

**STANDARD SIZES—HOW TO ORDER**

Available in all flask sizes, 3/8" to 2" thick. Standard plates are octagonal in shape with 1" allowance for flask and 2 1/2" allowance for ears. Sheets are also available for own cutting. Sizes are 46" x 46" for thicknesses from 3/8" to 1 1/2" inclusive; 40" x 40" for thicknesses over 1 1/2". Please write for sample and complete information.



## MARATHON CHEMICAL COMPANY
DIVISION OF MARATHON PAPER MILLS COMPANY
**ROTHSCHILD** **WISCONSIN**

# FOUNDRY COMMENT

LAST month on these pages I reported on the "beer and pretzels" suggestion of Dr. William P. Edmunds, Cleveland area director, War Manpower Commission. If the good doctor had been willing to permit his participation in the foundry labor problem to rest there, everything might have settled down to the normal situation. But like so many men connected with the war agencies, he evidently believed that he had a special mission to perform for the foundry industry, and running true to the general type, he approached this mission with the zeal of an evangelist.

First of all he had a survey prepared by the members of his staff. This survey said some rather uncomplimentary things about labor morale and working conditions in the foundry industry of the Cleveland district. A copy of this survey written for use within the WMC, was sent to me upon request, and the accompanying letter stated: "Although we believe the facts in the report to be true, their direct public statements might discourage badly needed new workers from entering the foundry field. We are glad to send you a copy of the report for your information, but request that it be used with discretion in this respect." But this report was sent to the local newspapers and became the basis of a series of three articles presented in the *Cleveland Plain Dealer*. The author, Roelif Loveland, a feature writer on that newspaper, reproduced much of the material in the report in his series of articles. To present an idea of the type of publicity which is being accorded the foundry industry in Northern Ohio, much of the three *Plain Dealer* articles is included in the following:

### WAR PLANT FOUNDRIES, EAGER FOR MEN, LACK "IT"

Industry cannot turn out glamour items like tanks and planes and guns unless it has unglamorous hunks of metal with which to start working.

It cannot proceed without the products of the foundries and the forge shops, no matter how much others may wave the flag or twist the eagle's tail.

Amid dirt and noise and heat and sweat, unheralded and unsung, common labor has it in its hands to make or break production schedules.

Cleveland is the second largest producer of drop forgings in the world and the fourth largest producer of castings, and the distressing truth is that a bad shortage of so-called common labor exists in both foundries and forge shops, not only here but throughout northern Ohio.

It has reached such a point that if it is not corrected it may interfere seriously with prosecution of the war. The War Man-Power Commission is concerned. The army and navy are concerned. . . .

Why does the shortage exist? Well, according to facts collected by the War Man-Power Commission here, these are some of the reasons: (1) The basic scarcity of strong, draft-age men capable of qualifying for the present openings due to the draft, and the calls on this class of worker by other industries; (2) the bad reputation as a place to work which foundries have acquired over the years; (3) the inability of foundries to hold on to such men as they find.

A study prepared for Dr. William P. Edmunds, Cleveland area director of the War Man-Power Commission, showed the following large turnover in two months of this year in the following types of Ohio foundries: Gray iron, 8.7 per cent; malleable, 9.5 per cent; steel, 7.3 per cent; aluminum and magnesium, 9.3 per cent; nonferrous, 5.6 per cent. The study indicated the large majority of the turnover—practically all except that due to the draft—occurred among new workers who were hired at laboring jobs.

Commenting on causes for this turnover, the study said:

"Worker morale, working conditions and rate of entry pay are the three most common factors.

"In no plant yet visited where there was good morale has a high turnover been found, irrespective of working conditions and pay. The turnover among new workers, who have not had an opportunity to absorb the morale of the shop, is, however, unsatisfactory in practically all cases.

"There is a definite tendency for plants with modern equipment and good working conditions to have a lower than average turnover, but there are notable exceptions to this in foundries with large additions and increasing labor needs and in foundries with difficulties in labor relations and poor worker morale.

"Plants with relatively higher pay rates also tend to fare better, but not without exception, and it is by no means the rule that low pay means high turnover."

The study dealt at length with morale, said plainly that foundries had the reputation as being places of "poor pay, hard, dirty and hot work and indifferent treatment. Workers hesitate to accept employment in a foundry when there are other opportunities."

"The treatment of these common laborers," the study continued, "has frequently been poor. No special attempt has been made to give them any pride in their jobs. Little attention has been paid to make their jobs any easier, improve their working conditions or conserve their health. Many foundry managers still speak disparagingly of them as a class of workers. One is reminded of the lack of interest shown the men who play on the line of a football team, as compared to the backfield.

"Foundries today are finding, as have football teams, that the whole team has to be conditioned, on hand and ready to play ball."

One Cleveland foundry, smarter than some, has equipped its men with sweat shirts bearing their names. When they come to work they tear down the ramp from the dressing room in their new sweat shirts, like a football team entering a stadium. And it is said they really tear into the work.

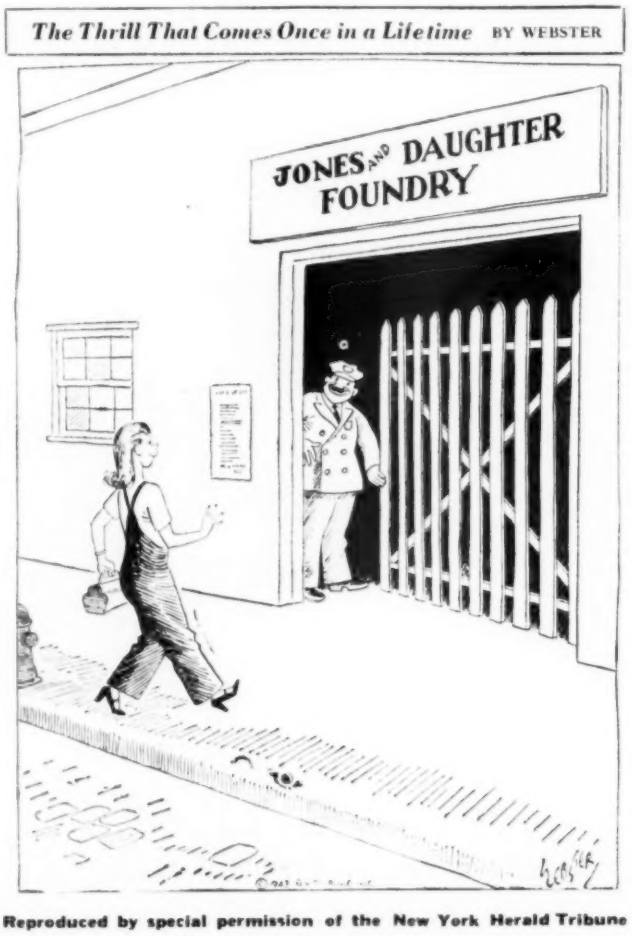
### IT TAKES A HE-MAN FOR FOUNDRY JOB

A foundry or a forge shop is no place for a sissy. It's hot and dirty, and sweat runs freely. But it's where they get those hunks of metal which subsequently fly through the air or sail upon the sea or maneuver beneath the sea.

It's the birthplace of machine guns and cannon, of bombs and torpedoes.

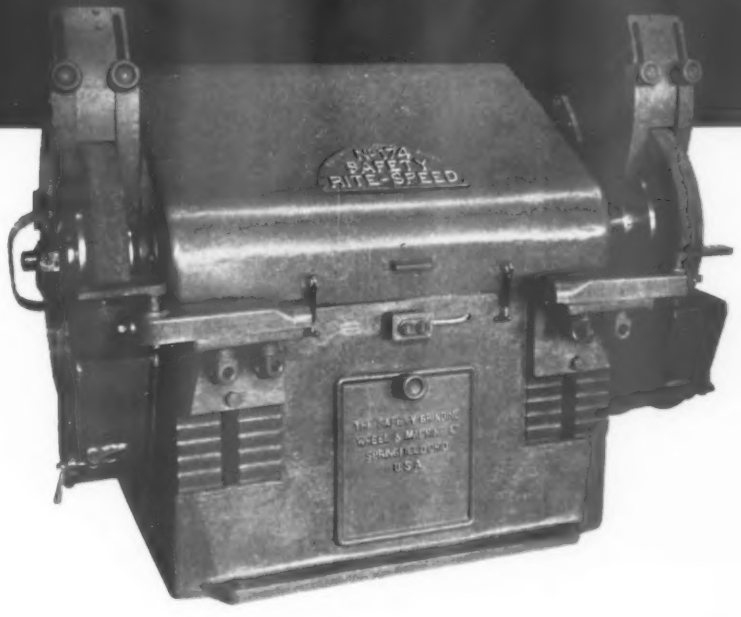
The perspiring, muscled men who work in the foundries and forge shops are soldiers, whether they know it or not, and without their aid the production line will stop. Unfortunately, because of serious man-power shortage, a bottleneck has developed in these industries to such an extent that the army

(*Continued on page 158*)




Reproduced by special permission of the New York Herald Tribune

# FEATURING A CHANGEABLE SPEED AND INTERLOCK TO SPEED PRODUCTION




## SAFETY "Rite-Speed" DOUBLE END STAND GRINDERS

Are you faced with the difficult problem of meeting increasingly heavy wartime production schedules? Then by all means investigate the Safety "RITE-SPEED" Grinder. Here is a machine that helps speed up production and reduces costs for you . . . instantly! Probably no other grinder equals the "RITE-SPEED" in providing a positive, convenient, safe means of maintaining grinding wheel surface speeds suitable for the fastest, most efficient and most economical production. Safety's *interlock* is a unique innovation that automatically cuts off the power when the grinding wheels wear to a predetermined diameter . . . assuring safety and economy. And the Safety *changeable speed system* enables correct surface speeds to be re-established by increasing the r.p.m. of the spindle at various diameters . . . this means *better work* and *more work* in *less time*. These are but a few of the many reasons why this Safety "RITE-SPEED" Grinder gives you the optimum in grinding operations . . . maximum precision and quality —greatest speed and economy. Write us today for "Rite-Speed" Bulletin No. F-170-42 and discover how this Safety "RITE-SPEED" Grinder increases production and reduces costs in your plant.

**SALES OFFICES IN PRINCIPAL CITIES**

**THE SAFETY GRINDING WHEEL AND MACHINE COMPANY**
SPRINGFIELD, OHIO

**. . . When Time Is Vital**
**Standard Conveyors Expedite Handling**

Oil is but one of many essentials of war whose handling is speeded up — in production and shipping — by Standard Conveyors.

Parcels and packages, destined for soldiers at home bases or overseas, are swiftly handled and dispatched with the aid of Standard Conveyor equipment in many metropolitan post offices.

Whatever the commodity, planned handling with Standard Conveyors assures uninterrupted flow and movement.

Whatever you make or handle now — or expect to in the future — Standard Conveyor Company has the "know how" for the building and use of power and gravity conveyors to your best advantage.

•

*Write for valuable reference book—"Conveyors by Standard" Catalog No. F-9.*

•

STANDARD CONVEYOR COMPANY
*General Offices:*
NORTH ST. PAUL, MINNESOTA
*Sales and Service in All Principal Cities*

ENGINEERED FOR FASTER PRODUCTION

(*Continued from page* 156)

and the navy and the War Man-power Commission are concerned.

There is only a nominal shortage of skilled workers. The greatest shortage occurs among the less skilled—the lads who go through their ordeal of toil and sweat for 70 to 85 cents an hour—the so-called but misnamed "common" laborer. There is nothing "common" about a man who can stand what these men stand. If you doubt this, see if YOU can last a day in a foundry!

No one is naive enough to suppose that, after reading a few paragraphs telling of their virtues, foundry laborers are going to give three cheers for themselves—and rush right back to work. They know it's hot, and they know it's dirty.

But it might be well for some of the rest of us to know, in a very rudimentary way, why it takes courage and strength to work in a foundry or a forge shop. What are some of the more rugged jobs? Let us consider, in order, the shake-out man, the chipper, the grinder, the sand blast operator, the rattler operator, the foundry helper and the foundry laborer. Incidentally, in the last 40 hot days the temperature on foundry floors has been in the vicinity of 120 degrees! Only the strong can take it.

Well, here's a shake-out man at work in a cast iron foundry. It's hot, dusty and smoky. He removes the cooled castings from the molds by knocking the clamps from the flasks with a hammer. Then he removes the flask around the mold by hand or with a hoist. Sometimes he lifts small castings from the sand and places them on top with an iron hook or shake-out tongs.

### Chipper Removes Fins

Here's a chipper. He's surrounded by dust and smoke as he removes fins and other undesirable projections from castings by using a hand hammer and cold chisel or a pneumatic chipping hammer or by operating a swing grinder which is suspended from a track or hoist and swung against the work by hand. This gives the castings a preliminary cleaning before they are rattled or sand-blasted. There is some danger of injury to eyes by sparks and flying particles.

Here's a grinder, surrounded by dirt, dust, noise and smoke. He stands at a stationary grinding wheel and holds a casting against the wheel with his hands. He grinds rough edges and fins from castings which are small enough so that he can handle them alone. He is responsible for dressing the wheel—holding an emory wheel dresser against it to true the surface.

Here's a sand blast operator who cleans and smooths the outer surfaces of castings by directing a stream of sand and compressed air upon the metal to cut facing sand and small rough spots from the casting. He must be careful not to mash his fingers or drop castings on his feet.

Here's a rattler operator. He works in dust and dirt—and it's so noisy that he becomes partly deaf while he's working. He cleans sand from castings and smooths their outer surfaces by placing them into a cylindrical drum, with iron stars. He revolves the drum slowly, by power, to allow the stars and castings to tumble against each other. Then he removes the cleaned castings.

Here's a foundry helper. His job is to assist the skilled worker in tending the

cupola, making sand molds, making sand cores, or in doing other skilled work around foundry by performing, as directed, heavy manual tasks of a routine and repetitive nature.

And here's the foundry laborer. Working in dust and smoke, he moves supplies and material from storage locations to workers and from workers to storage. He wheels molding sand to a location convenient to molds. He wheels core sand to location near core benches. He shovels core sand or facing sand into the mixing machine. He moves heavy flasks from storage to molding floor and from molding floor to storage. He cleans the molding floor, loads trucks, boxes or wheelbarrows with castings to be cleaned. He wheels castings to be rattled, chipped or ground.

It takes an uncommonly good man to stand up to it.

But it will take uncommonly good men to win the war.

### ABSENTEES KEEP FOUNDRIES SHORT

It is the belief of many who have studied the situation that the current shortage of man power in the unskilled labor departments in foundries and forge shops can be blamed almost entirely on absenteeism.

It is the belief of Dr. William P. Edmunds, Cleveland area director of the War Man-Power Commission, that if absenteeism from the job were cut down to a normal 2 per cent there would be plenty of men right here in Cleveland to keep the foundries and forge shops going 100 per cent. As it is, some foundries and forge shops in northern Ohio are working between 60 to 70 per cent of capacity.

"If all the men capable of working in these vital jobs would turn out for work every day we'd have too many and would have to send some of them home," Dr. Edmunds said.

Dr. Edmunds, a man with a vast capacity for understanding the other fellow's point of view, does not think all absenteeism from the laboring departments of foundry and forge shops is to be condemned. It is brutally hard work, and many of the men who are absent have been doing the best they can, he feels, and have worked to the limit of their capacity. But others, he believes, have just been taking a day off because it suited their fancy.

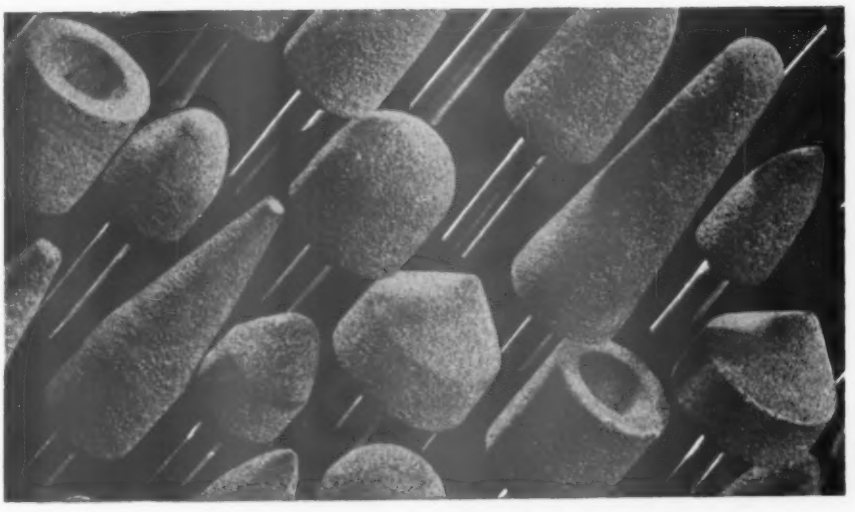
Dr. Edmunds has an idea that perhaps the best way to get labor on the job is to give the job—and the credit—to labor itself.

Some critics of the situation think other factors are involved in the shortage. Labor "hoarding"—keeping men on the pay roll when there is little for them to do and thus preventing them from being available for jobs in places where there is plenty to be done—has been mentioned as a cause. The cure for this evil, it has been suggested by more than one, would be to write contracts in Washington so that management would be considerably more conscious of costs.

Management in the foundry and forge shop industries feels pretty generally that not enough consideration has been given the skilled workers in these industries by the draft boards and that men have been taken who cannot be replaced.

But, according to a study prepared by Richard H. Abbott, regional chief of man-power utilization for the War Man-


SAY! YOU, UP THERE on the PRODUCTION FRONTS



No more holding up the steady flow of vital war needs because you're waiting for grinding wheels.

WE'RE RIGHT BEHIND YOU

Can make prompt deliveries on all Mounted Points and Grinding Wheels 3" in diameter and under. We've stopped making the larger sizes for the duration, so we can fill orders quickly for these important smaller sizes.

It's Our War-Time Job

With the approval and endorsement of WPB, all our facilities are concentrated on turning out large quantities of wheels 3" in diameter and under. We're at it 24 hours a day, and keeping up with orders. Our central location is an advantage and means no time is lost between our production line and yours.

AMERICA'S HEADQUARTERS FOR MOUNTED WHEELS SMALL GRINDING WHEELS

★ Half a century of specialization has established our reputation as the small wheel people of the abrasive industry

TRY ONE FREE

Tell us the kind of job, type grinder you use and size wheel you'd like for your test, and we'll send one free postpaid.

NEW CATALOG — shows mounted wheels in actual colors and sizes, portable electric tools and time-saving accessories for grinding, burring and polishing.

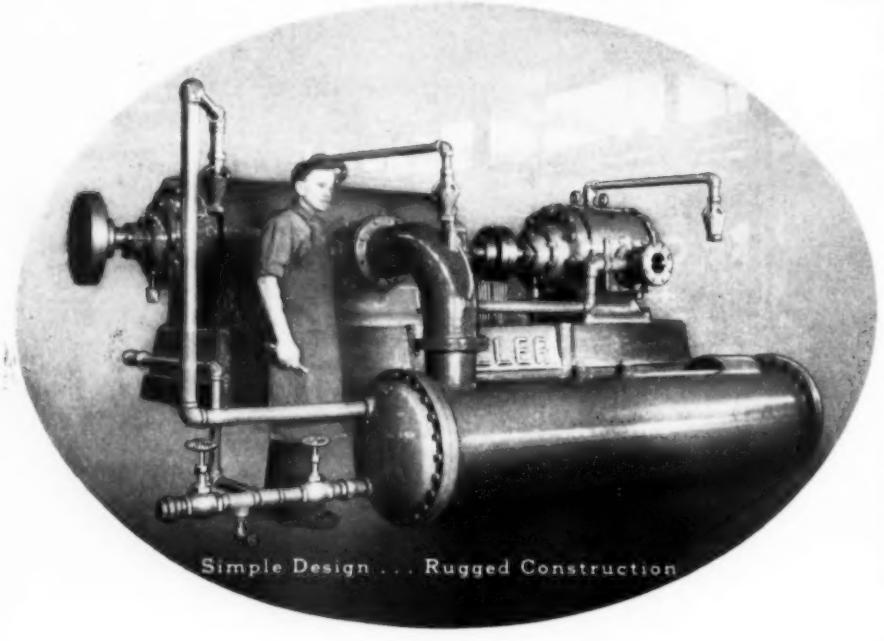
CHICAGO WHEEL & MFG. CO.
1101 W. Monroe St. Dept. FD Chicago 7, Ill.

☐ Send Mounted Wheel Catalog FD-9
☐ Free Wheel, Size.....
☐ Also interested in Grinding Wheels.

Name.....

Address.....

# *Depend on* FULLERS *for* Continuous Production




**FULLER Rotary Compressors and Vacuum Pumps show very fine records for long, continuous operation. This is due, in a large measure, to the simple design and rugged construction of these units. They have remarkably few wearing parts—rotor, bearings, blades . . . operation without vibration and air flow free from pulsations.**

**One of the most impressive features of these units is the extraordinary capacity in relation to size. The shop assembly of the two-stage compressor illustrated, and since installed in an airplane factory, has a capacity of 1665 C.F.M. actual free-air delivery, 125-lb. pressure . . . occupies approximately one-half the floor space required for most types of machines of comparative capacity.**

**Become better acquainted with Fullers. Send for Bulletin C-5, illustrating and describing these machines. It's yours for the asking.**

**FULLER COMPANY**
**CATASAUQUA, PENNSYLVANIA**

Chicago 3: 1144 Marquette Bldg.
San Francisco 4: 421 Chancery Bldg.
Washington 5, D. C., 618 Colorado Bldg.

C-81

**FULLER**
PIONEERS OF HIGH-EFFICIENCY ROTARY COMPRESSORS


Power Commission, there is only a nominal shortage of skilled workers except in foundries which have expanded rapidly.

Women have been working in some foundries in the following jobs: Chippers (except steel), light pedestal and bench grinders, acetylene torch cutters, electric crane operators, core fitters, sand mill operators, industrial truck drivers (both electric and gas), laboratory helpers, draftswomen, packers, filers, inspectors, coremakers.

But the great need, it appears, is in the unskilled labor department, and Abbott's study concluded that the foundry and forge shop common labor shortage was rapidly getting so serious that immediate action would be necessary to maintain war production.

Possibilities of action suggested in the study included these things:

1—Reduction of turnover by rapid development of workers' morale in present foundries.

2—Subcontracting a large part of laboring work, particularly rough grinding.

3—Concentration of the foundry industry into modern and low-turnover plants and transfer of laborers to the better conditions there obtainable.

4—Tighter control of labor migration.

"The first possibility," the study said, "is the most practical if it can be accomplished. The responsibility to develop such a program must rest largely with the foundries themselves."

But in the last analysis the answer to the problem lies with the men themselves.

Perhaps they will say: "Sure, it's hard, dirty work, but it's vital and we've got to win the war and the work has to be done, I may not be a soldier with a chest full of medals, and I may not be a sailor with a bosom full of campaign ribbons, but when it's all over and the grandchildren say 'Grandpa, what did you do in World War Two?' I won't be ashamed to tell 'em."

If they think along these lines the bottleneck will be broken.

### Problems Became Difficult

Undoubtedly, the *Cleveland Plain Dealer* had no intention of damaging war production of Northern Ohio foundries through the publication of these stories. But the fact remains that problems of labor supply became more difficult following appearance of the articles.

Around the middle of August another government agency took a hand in the foundry labor situation, and the handling of the problem in this case was just as inept. The fifth regional War Labor Board issued "sound and tested going rates for key job classifications in the foundry industry." The classifications apply in approximately 45 labor market areas in Ohio, Kentucky and West Virginia, and are designated as "ceiling" rates. In announcing the schedule, the board stated that the rates represent the maximum which the regional board may approve, except in accordance with the Little Steel formula or in rare and unusual cases in which the critical needs

or war production require that special consideration be given. It was pointed out that any adjustment proposed in accordance with these rates still require approval of the board before they can be put into effect.

As might have been expected, foundry workers looked upon the schedule as a wage increase ordered by the government. The following day after the announcement of the new schedule, production in three Cleveland foundries had stopped because the workers expected these rates to be put into effect immediately without going through the formality of submitting the proposed increase to the regional War Labor Board.

It is reported that the foundry industry of the district was not consulted until the rates were ready for announcement. Because these war agencies do not know the answers to many problems, and are unwilling to seek advice and help from industry where experience has developed much practical knowledge, war production in foundries continues to suffer.

F.G.S.

---

## Book Review

*Practical Wood Patternmaking*, by J. Robert Hall, instructor of patternmaking and foundry, Santa Monica Technical School, Santa Monica, Cal.; cloth; 188 pages 8¼ x 11 inches; published by McGraw-Hill Book Co. Inc., New York; price $3.00.

This book attractively bound and printed on heavy coated stock, is designed for use in vocational or technical schools and in apprenticeship training. Instructions proceed step by step from blueprint reading to simple patterns, and then to patterns that present more complicated features. The instruction and practice material profusely illustrated is grouped into divisions of various phases of patternmaking. Initiative is developed by the illustrations, drawings and blueprints which permit the student to proceed independently. If one might venture a mild criticism, it is that the occasional references to foundry terms and foundry practice do not indicate the same degree of accuracy and intimacy shown in the patternmaking text. For example: Facing, Powder used on a pattern or parting to keep it from sticking! Gray iron is referred to as "gray in color and very brittle".

---

Forest City Foundries Co., Cleveland, recently published an attractive booklet entitled "Let's Take a Trip Through the Forest City Foundries". This well illustrated publication starts with the pig iron, and takes the reader on a visit to the charging floor, pattern storage, molding floors, core making departments, the pouring and shakeout, the annealing departments, and the cleaning rooms. Side trips include the pattern shop, the laboratory. Consideration is given to the wide variety of castings produced by that organization.

DUST CONTROL
MEANS ECONOMY
ON THE PRODUCTION FRONT

• Dust Control, effecting worthwhile savings in time, labor and materials, has been accepted as a great economy factor on the production schedules of modern industrial plants. The thirty-five years' experience and progress which give to Pangborn the leadership in the field of Modern Dust Control are successfully applied day after day—in almost as many different ways as there are industries.

• At a plant located in the heart of one of our great industrial cities—specializing in work which creates a vast amount of dust—effective Dust Control had long been desired but, in spite of extensive installations for the purpose, the problem could not be solved. Corrective results were recently achieved with a small Pangborn cloth screen Dust Collector which was installed in conjunction with the customer's entire collection system.

• Because of the outstanding success of this initial installation, the company decided to purchase the larger unit which is pictured above. After a short period, they equipped their eastern plant with similar collectors and have now ordered *four more* units for their main plant.

• This standardization on Pangborn equipment, based on actual operation experience, is proven evidence of the value that progressive management places upon the economy of effective Dust Control as obtained through Pangborn equipment and engineering service.

ARMY E NAVY

Send today for your copy of our new bulletin #909 which will help you to visualize the savings *you can* effect through Modern Dust Control.

PANGBORN

WORLD'S LARGEST MANUFACTURER OF DUST COLLECTING AND BLAST CLEANING EQUIPMENT

PANGBORN CORPORATION · HAGERSTOWN, MD.

★

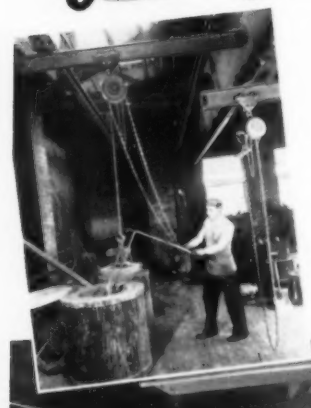
*from furnace to pouring*

VIA

CHICAGO TRAMRAIL

**MONORAIL CRANES**

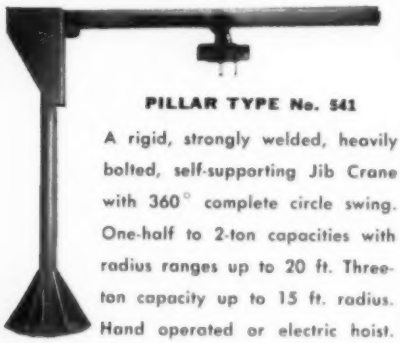
*Faster . . . Safer*



*Photos courtesy Atlantic Brass Works—Chicago*

★ View at top shows man pulling a crucible of molten brass, which will soon be whisked from the furnace to the floor by a small-size Chicago Tramrail Furnace Crane. The skimming operation done, the load is then switched to the larger overlapping Monorail Crane (bottom view) which spans all molding points for rapid distribution of the liquid metal. All flasks can be poured direct from this crane.

A low-cost installation of this type is but one of many hundreds that have been designed and "built-in" by Chicago Tramrail engineers for speedier and safer overall foundry operation.



**PILLAR TYPE No. 541**

A rigid, strongly welded, heavily bolted, self-supporting Jib Crane with 360° complete circle swing. One-half to 2-ton capacities with radius ranges up to 20 ft. Three-ton capacity up to 15 ft. radius. Hand operated or electric hoist.

*and at the* **"SHAKE-OUT"** *use* **JIB CRANES. Here's Why:**

These nimble Jib Cranes swing fully 360° to receive loads from all overhead cranes that converge at the shake-out.

And Jib Cranes are handling this operation with greater flexibility and speed, meanwhile releasing overhead cranes for other work. When ordering be sure to state lifting capacity, length of arm and distance from floor to arm. Illustrated circulars obtainable on request. Write

**CHICAGO TRAMRAIL COMPANY**

2910 CARROLL AVE. Phone KEDzie 7475 CHICAGO, ILL.

# MALLEABLE IRON CASTINGS FOR ORDNANCE

(*Continued from page* 104)

savings, as in the other cases, were effected.

In motorized equipment, advantageous malleable uses are many. Fig. 4 shows jeeps, scout cars, half tracs and motorcycles, and accompanying malleable iron parts are shown in Figs. 5, 6 and 7. In the jeeps, scout cars, and half tracs the requirement of front, as well as rear wheel drive, doubled malleable use in differential carriers, cases, and bearing caps. Also new steering problems, involved in the driving front wheels, occasioned the use of additional steering knuckle parts of malleable iron. Motorcycle hubs and frame members are also cast in malleable iron to advantage. Many tons of malleable iron form parts of the combat vehicles shown in this illustration. In Fig 3 is a tank steering gear housing in malleable iron, illustrating possibilities of design. Tank gun elevating mechanism castings are shown in Fig. 2. Another recent application in which malleable has been used to advantage is in the newly developed motor vehicle antiaircraft gun mount, Figs. 8 and 9. Here three malleable iron castings weighing 25 pounds each are employed.

### Use Pearlitic Malleable

A discussion of malleable iron castings in ordnance would not be complete without mention of the effective part played by pearlitic malleables in a number of applications. Ordnance early recognized the possibilities of this type of malleable iron, which has increased strength and wear resistance, although of course, at some reduction of ductility and machinability as compared with normal malleable. As adequate specifications were lacking in both government and industry, it was necessary for ordnance to pioneer and develop specifications.

Three grades of pearlitic malleable were developed, ranging in yield point from 43,000 to 60,000 pounds and elongation from 10 to 5 per cent with corresponding hardness ranges.

An application in which pearlitic malleable has effected great savings and been of inestimable value, due to its many-times greater life, thereby "keeping the tanks rolling," is the tank track roller illustrated in Fig. 12. These rollers were formerly made from steel, and consisted of a cast hub weighing 34½ pounds in the rough, which was machined to take a steel tube with ½-inch wall and weighing 17½ pounds. Two pounds of welding rod were required to weld the tube to the hub. The roller was then machined and weighed 48 pounds finished.

This assembly has now been replaced by a pearlitic malleable casting weigh-

ing 60 pounds in the rough and 57 pounds finished. The outer diameter is cast within a $\frac{1}{8}$-inch limit and does not require machining. To assemble weld and machine the steel roller required $2\frac{3}{4}$ hours time as compared with a one-hour machine time for the pearlitic malleable. The average life of the malleable roller is ten times that of the assembly first used.

Another, even better known, pearlitic malleable application, is the cover plate of the tank track. In this use thousands of tons of pearlitic malleable have gone into effective service. Also in numerous small arms applications pearlitic malleables have saved metal and machine time.

The ordnance department must make the most effective use of every available material if the tremendous production program is to be met. It has made a pronounced effort to replace more critical materials and to save machine tools and man-hours by the use of malleable iron. Whenever such changes are made, consideration must be given to distinctly different metallurgy and foundry practices, in order to make certain that the quality and dependability of the materiel is upheld.

Cost of service failures in war materiel differs from that of normal peacetime items,—one costing dollars, the other, lives of our own soldiers and perhaps battles. To utilize malleable iron to the maximum advantage the ordnance department retains a consultant from industry and leans heavily on an engineering committee created by the malleable industry to co-operate with and advise in the use and quality of their product.

## Book Review

*Heat Treatment of Metals*, by J. Winning, fabrikoid, 99 pages, $5\frac{1}{2}$ x $8\frac{1}{2}$ inches, published by Chemical Publishing Co., Brooklyn, N. Y., price $1.50.

This volume is primarily designed for engineers and others who are not metallurgists but who come in contact with heat treatment and its problems. The text gives a condensed version of heat treating methods and the underlying principles. It is divided into eight chapters of which the first covers the general principles. The second describes furnaces and equipment which by the way are confined to those used in British practice, and the third chapter discusses case-hardening. Chapter IV is concerned with hardening machines using oxyacetylene flame and induction heating to produce surface hardening. Carbon and alloy steel hardening is outlined in Chapter V while Chapters VI and VII discuss briefly heat treatment of stainless and rustless steels and nonferrous alloys. Final chapter is devoted to considerations of arranging a heat treating department. This book presumably is reproduced by photographic method, resulting in material that is harder to read than straight printed matter. Text on some of the pages is lighter than on others and reproduction of halftone engravings, especially of micrographs, are rather poor.

MOUNTED WITH COOLING UNIT

**JUST PLACE IT ON THE FLOOR**

**and hook up to current and air lines . . . . . .**

In spite of the fact that the SCHRAMM Compressor unit shown above comprises motor, compressor and radiator, it actually is a "one-piece job". All are assembled rigidly and in perfect alignment on a substantial steel base which can serve as a vibrationless foundation. No belts, pulleys, flywheels or water connections are necessary.

**If it's a Schramm** you can pack a 600 cu. ft. per min. job into a space measuring only 90 ins. x 37 ins. Schramm's vertical, in-line design makes it a neat, compact package, for heavy and continuous service . . . Motor controls for the required starting current and torque can be furnished as a part of the unit or for remote installation . . . Sizes range from 50 to 600 cu. ft. displacement at 100 lbs. pressure.

**Schramm Water-Cooled Air Compressors can be depended on for outstanding performance and satisfactory cooling under all temperature conditions, summer or winter, because water jackets completely surrounding cylinders and heads assure uniform cooling.**

**THE DATA YOU'LL WANT** *before deciding on any compressor can be found in our Catalog 42-S. Your request will bring a copy by return mail. Write today.*

**SCHRAMM INC.**

**THE COMPRESSOR PEOPLE**
**WEST CHESTER**
**PENNSYLVANIA**

*Manufactured by*

**STANDARD HORSE NAIL CORPORATION**

**NEW BRIGHTON PA.**

# KOOL HEAD FOUNDRY CHILL NAILS

**SLIM BLADE**

**Made in Lengths Over All**
1 11/16" 2 1/16" 2 1/16" 2 3/4" 3 1/16"

**MEDIUM BLADE**

**Made in Lengths Over All**
2 1/16" 2 1/16" 2 3/4" 3 1/16"

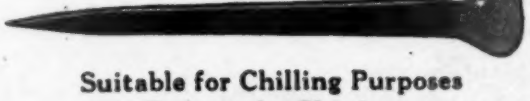
**HORSE NAIL BLADE**

**Made in Lengths Over All**
2 1/16" 2 1/16" 2 3/4" 2 1/16"

**JUMBO PATTERN**

**Made in 3 1/16" long only**

**HORSE NAIL SECONDS**



**Suitable for Chilling Purposes**
**But not for Shoeing**
**Sizes No. 5 to No. 11**

**HORSE NAIL STUBS**

**Made in Lengths**
1" 1½" 2"

## Obituary

**EDWIN RODENBAUGH WOLVERTON**, 62, a founder and president of Bloomsbury Graphite Co., Bloomsbury, N. J., died July 8 at the Easton Hospital after a short illness. Mr. Wolverton started his career as salesman for T. P. Kelly & Co., 42 years ago and finally handled all Western sales for that firm with headquarters in Chicago. When his uncle T. T. Hoffman of Bloomsbury, who first established graphite mills there in 1882 as one of T. P. Kelly's suppliers, decided to retire, the property was sold to the Wolverton brothers, Ed and Tom, and their associates, who organized to sell direct to the trade. Associated with Mr. Wolverton were Frank C. Hoffman, son of T. T. Hoffman, who continues as general manager, and Michael F. Murphy, service salesman. There will be no interruption in the business.

° ° °

**Charles E. Malley,** 42, sales manager of the Springfield, O., plant of the Ohio Steel Foundry Co., died at his home on July 11 following an illness of several months. Mr. Malley had been connected with the Ohio company since 1924 and had been sales manager at Springfield for the past 7 years. He was a specialist on the engineering application in sales of the company's heat and corrosion resisting alloy castings, was a member of the OPA Steel Casting Industry Advisory Committee and was active in the affairs of the Alloy Casting Institute and the Steel Founders' Society of America.

° ° °

**Allen Seymour,** Philadelphia district manager, Abrasive Division, Norton Co., Worcester, Mass., died July 30. Mr. Seymour had been connected with the Norton Co. for 25 years and in charge of the Philadelphia branch since 1934. Previously he was manager of the Hartford district and head of the sales engineering department at Worcester.

° ° °

**Elton G. Grammes,** 50, production manager, John Harsch Bronze & Foundry Co., Cleveland, died July 27 in that city.

° ° °

**Nicholas K. Beyers,** 57, for the past 20 years general superintendent of the American Foundry Equipment Co., Mishawaka, Ind., died in Ludington, Mich., Aug. 2.

° ° °

**William S. Shields,** 77, secretary-treasurer of the Hardie-Tynes Mfg. Co., Birmingham, Ala., died in Sheffield, Ala., Aug. 1. He had been connected with the company for 40 years.

° ° °

**Charles Prochaska,** at one time superintendent of the Eberhard Mfg. Co., Cleveland, and later connected with the National Malleable & Steel Casting Co., Cleveland, died recently at the age of

82. Mr. Prochaska also was one of the incorporators of the Vlchek Tool Co., Cleveland.

° ° °

**John S. Spalding,** 68, president of the Spalding Foundry Co., Atlanta, Ga., died at his home in that city, July 30. A native Atlantan, he was widely known among southeastern industry.

° ° °

**Charles D. Hogan,** secretary, United States Electrical Tool Co., Cincinnati, died July 20.

## READERS' COMMENT . . .

To The Editors:

If you continue to hammer away, after the manner of W. W. Rose's piece in July's issue of The Foundry, you may get college graduates and the foundry industry to take each other much more seriously than they do now; which will be fine business for both.

It seems to me that Mr. Rose's important position in the foundry industry gives his remarks a particular authority.

Of course, foundrymen blame college graduates for avoiding their shops and contend that the college boy is afraid of real work, that he doesn't want to get his hands dirty, that he expects to be vice-president of the company the second week and so on through a long familiar series of grievances.

But I don't think the college boys are to blame. There may be much wrong with them but most of what is wrong is the fault of their elders.

For instance, if there is any one doctrine which has been preached to the young generation day in and day out for the last 20 years by all the prophets of progress, it is the doctrine that engineering, applied science and the utilization of power have emancipated mankind from back-breaking toil in the industry, and that modern intelligence has substituted steam, compressed air and electricity for the strong back. College students take this sort of thing seriously; they believe that it has happened. They have no reason to believe that the prophets are fooling.

Accordingly, when these boys encounter an industry in which, in spite of the prophets, there is a considerable survival of manual work, they will draw conclusions which may be right or wrong but which are very certainly inevitable.

Please accept my compliments on publishing this discussion by Mr. Rose of a problem which is important and is likely to become more so.

C. S. Freund
Dean of Engineering

*University of Detroit*
*McNichols Road at Livernois*
*Detroit*

---

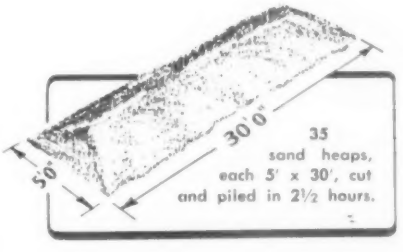
Burdett Mfg. Co., 19 North Loomis street, Chicago, has published a new 16-page catalog describing applications and capacities of its infra-red principle gas burners.

**15c A HEAP** . . . including carrying charges, labor, power and maintenance—is the cost of cutting and piling molding sand with a Sandcutter at a prominent agricultural machinery plant.

And if that were not something to start sharpening a pencil over, here is something that is: this Sandcutter cuts and piles 35 heaps, 5 ft. wide by 30 ft. long in only 2½ hours!

The example cited is not unusual, nor is it even too remarkable for a Sandcutter—hundreds of other installations show records of even greater performance, as we will be glad to demonstrate.

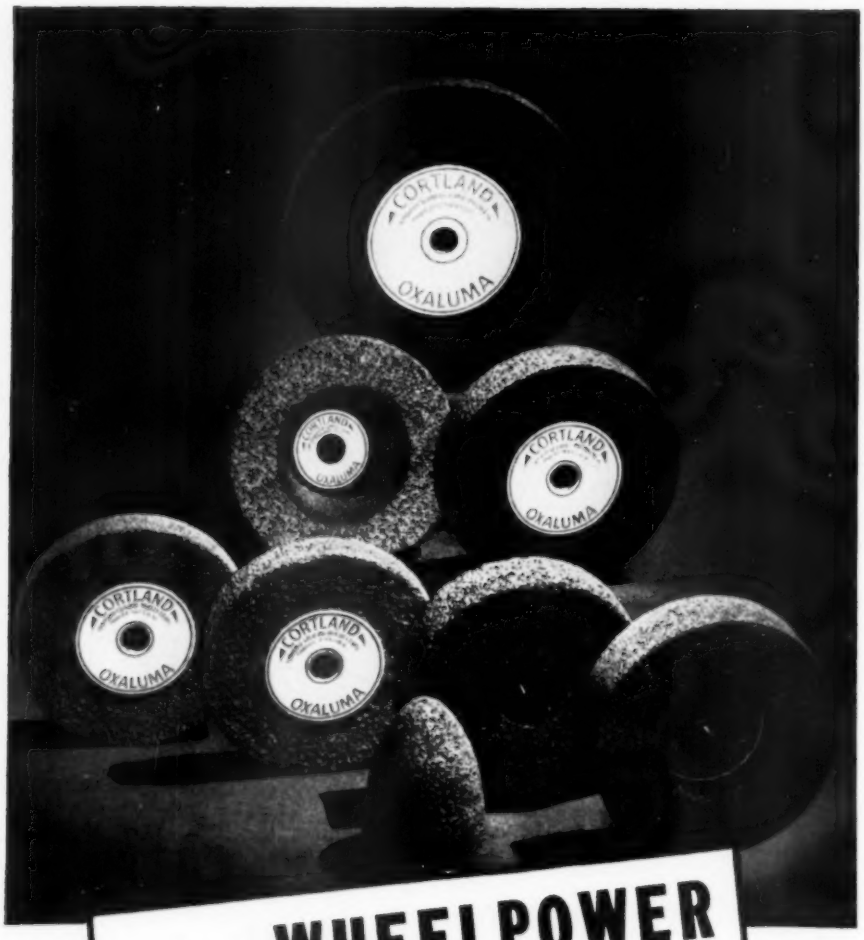
The fact that more than 1500 Sandcutters are used by foundries of all types and sizes is evidence of the prevailing confidence in this cost-cutting method of conditioning sand.




Check the advantages of Sandcutters without fail—either by writing for literature, or by asking one of our sales engineers to call for an investigation of your problem.

**AMERICAN FOUNDRY EQUIPMENT CO.**
505 S. BYRKIT ST. • MISHAWAKA, IND.

**SANDCUTTERS**




plus **WHEELPOWER**
minus **WHEELCOST**

In tests with other brands, Cortland Snagging Wheels have shown a *lower* WHEEL COST PER POUND OF METAL REMOVED.

In a foundry test covering two 9½ hour runs, a Cortland wheel removed 101 lbs. of metal with 82.44 cu. in. wheel wear, while the competing wheel removed 103 lbs. of metal with 195.48 cu. in. wheel wear.

137% greater wheel wear is a high price to pay for only 2% more metal! . . . a whale of a price when you add time out for wheel changes!

Cortland has long specialized in Snagging Wheels of all types and sizes—for swing frame, floor stand and portable machines.

15

*For Better Snagging*
**CORTLAND**

**CORTLAND GRINDING WHEELS CORP. • CHESTER, MASSACHUSETTS**

# ACTIVITIES OF FOUNDRY GROUPS

## MILWAUKEE

MILWAUKEE Malleable Club completed its activities for the year on June 19 with its annual picnic at Meadowbrook Country Club, Racine, Wis. Marked by perfect weather, the occasion provided foremen and vendors an opportunity for relaxation from the strain under which they have labored the past few months.

While golf was the principal sport of the day, the usual variety of activities was offered. A sumptuous chicken dinner in the evening was followed by the awarding of prizes to winning golfers and the drawings for door prizes.

The outing was voted one of the most successful and enjoyable held by the Malleable group. In charge of arrangements were: J. E. Bissett, Wisconsin Appleton Co.; M. A. Harder, Lakeside Malleable Castings Co.; and J. Molenda, Milwaukee Malleable & Grey Iron Works Inc.—*Joseph G. Kropka, secretary.*

° ° °

## WESTERN NEW YORK

FILLING of two vacancies in the board of directors of the Western New York Chapter of the A.F.A. completes the board membership, as follows:

Term expiring in 1944: Ed. P. Meade, Rochester; Ralph T. Rycroft, Jewell Alloy & Malleable Co. Inc., Buffalo; Henry F. Sproull, A. P. Green Fire Brick Co., Buffalo; James L. Yates, Worthington Pump & Machinery Corp., Buffalo.

Term expiring in 1945: Elliot R. Jones, Lumen Bearing Co., Buffalo; Everett E. LeViness, Combined Supply & Equipment Co., Buffalo; R. T. Melville, Hanna Furnace Corp., Buffalo.

Term expiring in 1946: Charles O. Burgess, Union Carbide & Carbon Co., Niagara Falls; Martin J. O'Brien, Symington-Gould Corp., Depew; Alfred A. Diebold, Atlas Steel Casting Co., Buffalo.

—*J. Ralph Turner, secretary.*

• • •

## WISCONSIN

ANNUAL golf and stag meeting of the Wisconsin Chapter of the A.F.A. was held Friday, July 16, at the Ozaukee Country Club. Despite the deluge of rain, golf continued throughout the day. The rain held up early crowds, but by the time dinner was announced, a record crowd of 667 members and guests were on hand.

Directly preceding the dinner, George K. Dreher, Ampco Metal, Inc., Milwaukee, and president of the chapter, made a few remarks and then introduced Joe Risney, chairman of the golf party. Mr. Risney and his committee proceeded to pass out the golf prizes to the champs of the day and to others who were lucky. A large number of War Bonds were passed out as door prizes. An excellent floor show climaxed the entertainment of the day.

The first regular fall meeting of the

chapter will be held on September 17. —*Darold W. Thiem, chairman of publicity committee.*

## Offers Course in Metallurgy

Twenty-four foundrymen, representing 22 Chicago foundries, are going "back to school" at Illinois Institute of Technology, Chicago. These men are taking a special course in cast iron metallurgy designed to relieve the shortage of metallurgists in the foundry in the Chicago area.

It is only one of many war training courses sponsored at Illinois Tech for specific war industries, and is tuition-free. The work is being given through the co-operation of Illinois Tech and the Chicago Chapter of the American Foundrymen's Association, of which all the men are members. It is underwritten by the United States Office of Education, through its engineering, science and management war training program.

The men in the class include operating supervisors, production control men, foremen and superintendents. They go to school for 16 weeks, two nights a week. The course covers subjects such as iron carbon diagram, effects of alloys, graphite formation, heat treatment and testing methods.

One night each week is spent in the classroom where the technical aspects of cast iron, such as the crystal structures and the effect of alloys, are discussed. A second evening each week is devoted to the laboratory, where the men study such physical properties as tensile, compressive and transverse strengths, deflection, impact resistance and hardness, as well as the effect of microstructure on those properties. These men prepare and test their own specimens. At the end of the courses, each man will be required to make a complete report on an iron cast in his own plant. The report will include a complete investigation of the iron, including physical tests and photomicrographs of the structure.

Charles F. Walton, metallurgist, the Association of Manufacturers of Chilled Car Wheels, Chicago, teaches the course. Mr. Walton originated the idea of a war training course in cast iron metallurgy. The course will be repeated at Illinois Tech in October.

Hamilton Foundry & Machine Co., Hamilton, O., recently has published an excellent booklet entitled "Quality Castings by Hamilton". The presentation describes and illustrates briefly the experience of that company in the production of quality castings for a period of over 50 years. The remaining 28 pages are devoted to illustrations of the many types of castings produced, beginning with resistance grids, and extending through such castings as scale parts, machinery parts, gears, ornamental work, hardware, heater castings, cams and many others. Photographs of the laboratory and foundry are included.


United States has 4802 FOUNDRIES*
with many, many uses for this machine!

*Reprinted from THE FOUNDRY, July 1943

NEW!

MARSCHKE "In Between"
Direct-Drive Swing Frame GRINDER

The name of this machine derives from the fact that it fits between heavier swing frame grinders and lighter portable and flexible shaft machines.

It is made with 3 HP., 1800 RPM motor driving a 12" x 2" wheel. Standard equipment includes magnetic push button control, overload and undervoltage protection, bronze bushed swivel collar suspension with clamp lock, a handle along each side and one above guard. It is 5 ft. long and weighs 300 lbs.

The combination of handles, swiveled and balanced suspension makes this machine unusually maneuverable, enabling an operator to angle it for reaching every exposed surface on all sizes and shapes of castings. Wheel guard may be removed for grinding internal surfaces of larger openings and this machine is equally practical for reducing weld seams of large plates and other fabricated structures.

The work performed is always in view of operator. Ample pressure is conveniently applied to assure metal removal up to full motor and wheel capacity. This machine is more productive and as is self evident, it also is more durable and dependable than lighter portable and flexible shaft machines.

★ *There are over 70 standard specifications of Marschke Swing Frame, Floor Stand and Pedestal Grinders and Buffers — from 1 to 40 H. P., 10" to 30" wheels and built to machine tool standards.*

THE MARSCHKE LINE

*manufactured and sold by the*

VONNEGUT MOULDER CORPORATION
1839 MADISON AVENUE INDIANAPOLIS, INDIANA

# WASHINGTON NOTES ★ ★ ★ ★

A NUMBER of war plants whose production programs were "cut back" a few months ago have been shifted over to other work which had been delayed by inadequate capacity. More developments of this sort may be expected as the war progresses with changing emphasis on demand for different types of materiel. Naturally the companies with most diversified facilities may be expected to suffer least from the scaling down of certain contracts, although the Production Resources Division of WPB is making a determined effort to find new war work whenever a plant has open capacity or has been shut down because no further need exists for the products it was turning out.

★ ★ ★

*Subcontractors to machine tool builders, an invaluable factor in boosting tool output to unprecedented heights, will be required to do some shifting of product by next year in view of the declining tool production in store for coming months. New orders for machine tools recently have been running only about one-third the volume of shipments, consequently a rapid reduction in shipments may be expected as the year draws to a close. Plans are under way for conversion of unused machine tool building capacity to production of other war items, although net requirements of castings seem certain to be scaled down by the changeover.*

★ ★ ★

UNLESS there is an unexpected change, all machine tools to be shipped to Russia between now and the middle of 1944 already are on order. United Kingdom requirements are not fully established, but present indications are that there will be no increase in shipments, and it is probable that there will be a sharp reduction by the first quarter of 1944.

★ ★ ★

*A general tightening of an already critical lumber situation is evidenced in the latest Material Substitution and Supply List of WPB. Most hardwoods and most 1-inch boards of all species are included in Group I, representing materials which are insufficient either for war demands alone or for war plus essential industrial demands. Supply of mahogany lumber suitable for patterns has been declining steadily.*

★ ★ ★

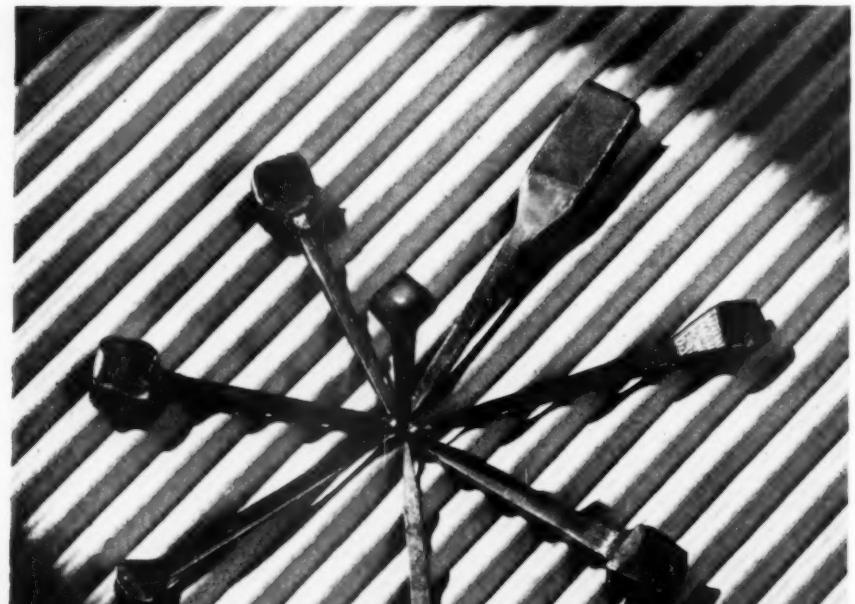
MORE than 1900 plants and projects representing 1600 companies had been granted the Army-Navy "E" through the middle of August, or less than 2½ per cent of the country's eligible plants. About 60 per cent of the recipients were nominated for the award by the Army, the balance by the Navy. Number of employes of the companies so honored varies from 1 to more than 126,000, although 58 per cent of the plants flying the "E" have less than 1000 employes. One plant which lost the pennant after 6 months for failing to maintain established requirements subsequently won the award again.

★ ★ ★

*Magnesium remelt ingot containing a combination of No. 4 and No. 17 alloys has been removed from the Grade A ingot price list by OPA and now is priced as a Grade B or Grade C ingot. Originally it was expected that a direct use would be established for this allow, but it has been found useful only for blending purposes. Maximum base price for Class A ingot is 21½ cents per pound; for Class B, 18½ cents, and for Class C 16 cents.*

★ ★ ★

CADMIUM supply is running short, with stocks reduced drastically and the government stockpile down to a one-month's supply. The aircraft industry, which accounts for about one-half of total consumption, will be limited during third quarter to only 75 per cent of es-


SMOOTH, CLEAN *CHILL NAILS* ASSURE SOUND CASTINGS

Because Capewell foundry chill nails are *cold rolled* from the finest soft iron, they are smooth, bright and clean. They fuse readily. With Capewell you have the most complete line from which to select the right nail for your purpose. . . THE CAPEWELL MFG. CO., Hartford, Conn.

CAPEWELL
FOUNDRY CHILL NAILS

timated requirements. WPB is scrutinizing all requests for cadmium more closely.

★ ★ ★

*Enemy patents seized by the Alien Property Custodian have been made available to operators of small war plants. The latter are being urged to apply to the office of the Custodian by writing, either to Washington or Chicago, for an index of classified patents which will enable them to select patents which may interest them. Previously only larger firms have reviewed the 40,000 alien patents and patent applications which are available.*

★ ★ ★

AUG. 23 was the last date on which sellers of aluminum scrap could make delivery at the old higher maximum prices in effect prior to June 23 under contracts entered into prior to the latter date. Secondary aluminum ingot had the same deadline for contracts entered into before Aug. 1.

★ ★ ★

*Maximum silicon content permitted in standard grades of high carbon ferromanganese has been raised from 1.25 per cent to 1.50 per cent. Another change in Revised MPR 138 provides that the maximum price at which independent warehousemen may sell manganese alloys shall be the producers' maximum price to the former plus 10 per cent for quantities of 500 pounds or over, 15 per cent for amounts of 100 to 500 pounds and 20 per cent for amounts less than 100 pounds.*

★ ★ ★

SILVERY pig iron maximum prices have been revised as follows: Price differentials for silicon content are set up on a range of ½ of 1 per cent; premium for each additional ½ of 1 per cent of silicon content now is permitted for any part of the increment in the premium bracket; penalty for a phosphorus content of 0.70 per cent or more is abolished; premium of 50 cents for each ½ of 1 per cent or fractional part of manganese in excess of 1 per cent is established.

★ ★ ★

*File sizes have been standardized and simplified by WPB to conserve material and increase productive capacity. An estimated saving of about 2160 tons of carbon steel is expected yearly through a reduction of thickness of the files and through a cut in number of sizes and types permitted to be manufactured.*

★ ★ ★

MANUFACTURE of certain sizes of graphite crucibles has been prohibited by WPB in another simplification move. Order M-61-a also bans production of any sizes of special crucibles which the maker had not been producing prior to July 27. Following sizes of standard crucibles no longer may be made: 0, 00, 000, ¼, ½, ¾, 1¼, 1½, 1¾, 3, 5, 7, 9, 12, 14, 18, 25, 35 and 45.

★ ★ ★

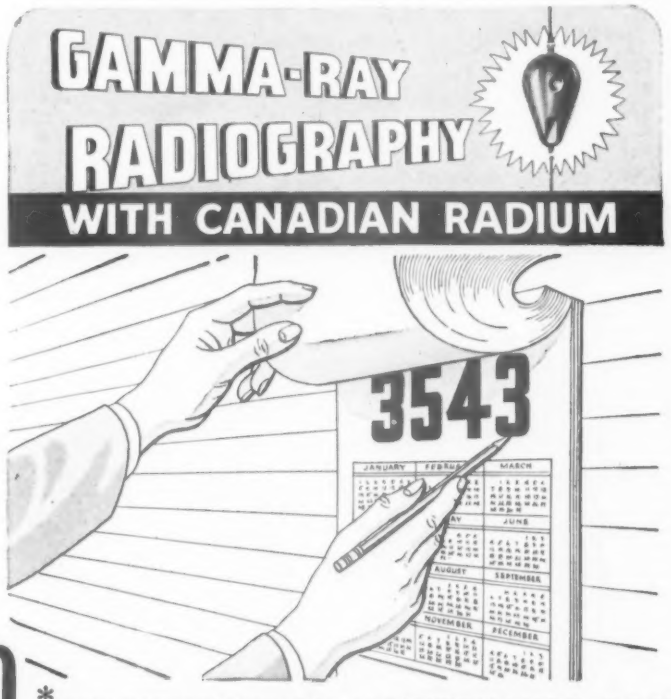
*Nonferrous metal smelters and refiners should apply directly to the Mining Equipment Division of WPB for maintenance, repair and operating supplies, instead of following the MRC procedure set up under CMP regulation No. 5. This is provided under amended Order P-73.*

★ ★ ★

OWNERS of idle welding equipment (not used more than 120 hours during a period of 90 consecutive days) are required to register such equipment with WPB on Form WPB-2732. The purpose is to create a pool of used equipment which is available to fill requirements of persons seeking new units, thereby minimizing new manufacturing. Authorization to purchase new equipment will be withheld if it can be supplied by the pool. However, no provision has been made requiring owners to sell their idle welding equipment.

*Producers of aluminum castings who are unable to make delivery in the calendar month requested may fill the order at any time during the calendar quarter or during the first month following the calendar quarter without reporting the fact to WPB or receiving another allotment number. If unable to make delivery during this period WPB must be notified in writing, indicating when the order can be filled. This notification then allows completion of the order without a new allotment number. Of course, the customer still has the right to cancel his order for failure to receive delivery on time.*

W.G.G.


NO* REPLACEMENT OR MAINTENANCE COST...
(*FOR 1600 YEARS)

When you use radium radiography for the internal examination of metals, you never have to repair or replace "parts" of the radium equipment. There are no "parts."

Depreciation of radium to half its present power will take 1600 years! Radium is self-powered, and operates without wires, mechanisms or attachments. All the equipment you need is a radium capsule, a supply of standard radiographic films and our exposure slide rule gauge.

With this simple set-up you can examine internally, any metal objects, large or small, in the plant or elsewhere. Radiographs are clear, dimensional pictures, revealing minute flaws and structural qualities, and are easily interpreted.

A radium capsule of any required strength can be rented or purchased outright. The cost in either case is probably much less than you imagine. Sufficient radium for radiographic inspection of the largest castings, can be purchased for less than a moderately powered mechanical outfit incapable of performing similar services. No wonder busy plants throughout America are adopting this thorough method of ensuring efficient production and sound workmanship.

It will pay you to investigate. Write for free Manual and full information.

R-83

*Free Manual*

Reliable, profusely illustrated 80-page textbook on the fundamentals and technique of modern Industrial Radiography of metals with radium. Recently prepared for the metals industry by our research and technical staff. Write for your copy today, giving your name and company position.

Canadian
RADIUM & URANIUM
Corporation
630 FIFTH AVENUE · ROCKEFELLER CENTRE · NEW YORK

# FOUNDRY ACTIVITIES

WAUKESHA Foundry Co., Waukesha, Wis., received the Army-Navy "E" pennant at ceremonies held July 29. Both the Waukesha and Watertown divisions won the award. The "E" flag was presented to C. C. Smith, company president, by Lieut. Comm. William E. Ferrall, submarine commander whose ship torpedoed ten Japanese ships. Edward Lemitz, the company's oldest employe received the "E" pin emblem from Capt. Edward J. Millot, provost marshal of the second district, Sixth Service Command.

° ° °

United States Pipe & Foundry Co.'s North Birmingham plant received the Army-Navy "E" at ceremonies held at the plant July 20. J. S. Bridges, resident manager, received the pennant from Lieut. Col. J. E. Getzen, executive officer of the Birmingham Ordnance District. James McDaniels and Robert Allen accepted the "E" pins on behalf of the employes from Lieut. Comm. E. S. Brown, resident naval inspector of material in Birmingham.

° ° °

Rushlight Steel Works, 3900 N. W. Street Helens Road, Portland, Oreg., is completing installation of a 5-ton, basic-lined electric furnace in its new steel foundry. Production of alloy steel castings is expected in September.

° ° °

Hannibal Car Wheel & Foundry Co., Hannibal, Mo., has been acquired by a Cincinnati syndicate made up of Coleman Harris, Joseph Karp and Louis Goldsmith for a reported $100,000.

° ° °

Production of steel castings for May totaled 163,812 tons compared with 161,403 tons in April and 131,492 tons in May a year ago. Orders for May totaled 192,531 tons, compared with 165,792 tons in April.

° ° °

Union Foundry Co. is the name under which Pedro Cuevas and Leo Cuevas have published intention to conduct business at 2268 East Fifteenth Street, Los Angeles.

° ° °

Potts Foundry Co., South Seventeenth Street, Sheboygan, Wis., plans a one-story addition to its foundry.

° ° °

Kay Brunner Steel Products Co., Alhambra, Calif., is building an additional storage building.

° ° °

A. H. Tallman Bronze Co. Ltd., Cavell Avenue, Hamilton, Ont., is building a plant addition.

° ° °

Wilkerson & Nutwell, 140 Callisch Street, Fresno, Calif., experienced $1000 loss in the burning of a frame annex to its foundry, June 26.

° ° °

Kenosha Foundry Co., Kenosha, Wis., recently has discontinued operations.


SPEED-UP CLEANING WITH

TYPE A

Combination drift and chisel speeds general hand chipping in malleable iron and grey iron foundries. Weight, 1¼ lbs.

CMD CHIPPING HAMMERS

**To speed up the cleaning and finishing of castings, equip your men with CMD Chipping Hammers. There is a type for every cleaning job. The heads are made from high-grade tool and steel that is hardened and drawn like a cold chisel. They are well balanced and easy to use. They hold their cutting edges a long time. Write today for descriptive circular.**

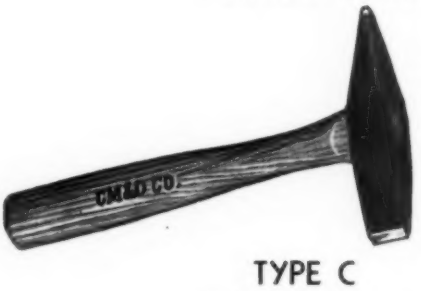
**CHICAGO MANUFACTURING & DISTRIBUTING CO.**

*Manufacturers of a complete line of chipping hammers, core-conveying equipment and other specialties.*

Dept. 9F, 1928 W. 46th Street CHICAGO, ILL.

TYPE B

Combination square face and drift. 4 cutting edges on face permit chipping from any angle. Weight, 12 oz.




TYPE C

Combination drift and chisel, similar to Type A but chisel edge is parallel with handle. Overall length of head 5 inches. Weight, 14 oz.


## Book Review

*The Industrial Cafeteria and Restaurant Workers Manual*, by Milton A. Rosenfeld, published by the National Foremen's Institute, Inc., Deep River Conn., $1.25.

The book has been written as an aid to persons inexperienced in restaurant work and the handling and preparation of food. The text material is therefore of an elementary type and includes suggestions on work habits for personnel ranging from those working in the kitchen to the cashier. Personal appearance and the cleanliness of the restaurant are stressed. Safety precautions are listed and suggestions are made in the proper handling of perishable foods. General hints on menu scheduling, food combinations and their presentation to the buying public are given.

# BASIC CUPOLA LINING

## Aids Desulphurization

ACCORDING to an article by E. S. Renshaw which appeared in the June 24, 1943, issue of *Foundry Trade Journal*, a basic lining, being tried in England, comprised of dolomite in the lower section of the cupola has resulted in a reduction of 50 per cent in sulphur content of the iron as compared to the usual acid lined cupola. Lining is monolithic type rammed in place and the material is stabilized dolomite clinker made by calcining dolomite with a predetermined amount of serpentine. Typical analysis of the material shows 14.44 per cent silica, 3.44 per cent iron oxide, 1.50 per cent alumina, 40.04 per cent lime, 40.30 per cent magnesia, and 0.25 per cent loss on ignition.

Experimental investigation was carried out in a cupola lined to 27 inches melting 2 tons per hour, and results obtained led to application on a production basis in a cupola lined to 36 inches melting 9500 pounds per hour. Some 3000 tons of low carbon iron have been melted so far with promising performance of the lining, but without sufficient data to give an accurate refractory consumption comparison with the acid lining. The basic lining 12 inches thick in the 36-inch cupola extends 4½ feet above the top tuyeres, and is rammed into place using expansion strips of wood spaced 2 feet apart. The strips are rammed in longitudinally with the material, and are 9 x 18 inches with a thickness of ⅜-inch tapered to 1/16-inch; the tapered section pointing to the shell. The strips were allowed to burn out during preheating. No backing bricks were used, but the material was vented at the shell by using steel rods ⅜-inch in diameter which were raised gradually as ramming proceeded. An alternate method is to use asbestos steam pipe lagging as a backing material to a thickness of 1-inch which is sufficient to accommodate expansion.

### Melt Various Mixtures

A front slagging spout is used. The author points out that careful ramming at that point is required to prevent erosion, and the metal of course, runs continuously. In the experimental work a number of different metal charges were melted to determine the desulphurization effect. Those included 100 per cent gray iron scrap; 96.6 per cent steel scrap with ferrosilicon and ferromanganese, and various combinations of gray iron scrap, malleable scrap, steel scrap and pig iron. With the 100 per cent gray iron scrap mixture the entering materials had a sulphur content of 0.120 per cent while the molten metal sampled every 15 minutes had an average of 0.056 per cent. Ordinary acid cupola melting would show 0.140 per cent sulphur. With the 96.6 per cent steel scrap charge, using 3 per cent ferrosilicon and 0.4 per cent ferromanganese, the entering material contained 0.055 per cent sulphur and the molten metal 0.049 per cent sulphur average. Acid melting would show 0.125 per cent sulphur.

Flux used was limestone with some fluorspar to provide sufficient fluidity to slag to flow over the notch. Amount of limestone varied from 4 to 7 per cent of the metal charge while the fluorspar was maintained at 1 per cent. The higher limestone appears to increase desulphurization. First tap in the experimental runs was high in sulphur, and the author's comments on that follow: "It will be seen that in each melt the first tap from the cupola gave a high sulphur figure. The reason for this is obvious, in so far as at this stage there is only a low volume of slag available in the well and the initial temperatures are below normal. This effect can be partly offset by making an addition of limestone to the coke bed."

In further reference to amount of slag and erosion of the tap hole the author states: "The effect of quantity of slag in

"Nearly right" won't do when it comes to Core Oils! Whether you buy one drum or a carload you need never be concerned about the uniform quality of DAYTON Core Oils. Write for full information.

**THE DAYTON OIL COMPANY • DAYTON, OHIO**

MAKERS OF DOCO BINDER & CORE PASTE • DOCO STEEL CORE & MOLD WASH

the well was again instanced as in melt 4 when an increase of sulphur was apparent at samples 7, 8 and 9 (sulphur increased from 0.046 to 0.068 per cent) which could be traced to an enlargement of the tap hole through erosion as mentioned previously. When this occurs, the slag level in the cupola is automatically lowered and the volume of slag is correspondingly reduced."

Color of the slag with the basic lining varies from a pale to dark brown, the former being obtained with low sulphur figures. Only difference in slag composition was an increase of 0.50 to 1.50 per cent in FeO and MnO contents. Over blowing the cupola and creating an oxidizing condition caused an increase in sulphur from 0.050 to 0.075 per cent with a change in slag color from pale to dark brown. Basic cupola slag shows a distinct chalky appearance particularly when desulphurization is at a maximum. Composition of pale brown slag shows 30.8 per cent silica, 0.52 per cent iron oxide, 44.04 per cent lime, 14.0 per cent magnesia, 8.74 per cent alumina, 1.08 per cent sulphur, and 0.83 per cent manganese oxide. The dark-brown slag contained 29.80 per cent silica, 1.47 per cent iron oxide, 45.15 per cent lime, 12.90 per cent magnesia, 6.46 per cent alumina, 1.00 per cent sulphur and 1.43 per cent manganese oxide.

CUT OFF

GATES and RISERS in any metal

in far Less Time with

Tannewitz METAL CUTTING BAND SAWS

Variable Speed

Models to fit Every Need

In addition to our regular High Speed Band Saws delivering over 2 miles of smooth vibrationless saw travel per minute, which have proved so exceedingly popular in automotive and aviation work, the TANNEWITZ line now offers five other models to provide the fastest cutting medium for every foundry need: a 30" machine available in any 3:1 speed variation from 100:300 or 1000:3000 blade feet per minute—a similar machine with 3-step V-belt drive to give 2300, 3100, 4000 blade feet per minute—a 36" machine with 32" capacity under the guide—a model with 48" wheels and one with 52" wheels, operating at 3,000 blade feet per minute for handling extra large castings. Get a line on the TANNEWITZ metal cutting band saw that fits your particular needs. It will save time, step up production and repay its cost dozens of times. Write for full particulars NOW!

THE TANNEWITZ WORKS, GRAND RAPIDS, MICHIGAN


# CRUCIBLES NEED CARE

(*Continued from page* 105)

will be surprised at the information such a record will reveal. This record should include the make of crucible, size, alloy melted, fuel used, weight of charge, pouring temperature, and any other remarks that may have a relation to crucible life.

Crucibles should be stored upside down in a dry place, preferably in an oven which is maintained as a storage oven which is large enough to hold at least a 2 weeks' supply.

Clay-graphite crucibles should be placed in a cold melting furnace while still warm from the drying oven and brought to the working temperature slowly. Silicon-carbide-graphite crucibles may be brought to the working temperature as quickly as desired after preliminary drying. Failure to follow these simple rules not only leads to premature cracking and spalling, but wastes strategic materials.

Perhaps the most potent factor to premature crucible failure is the use of ill-fitting tongs. Properly fitted tongs support the crucible just below the bilge over a large area and are shaped to prevent crushing of the brim. A worthwhile practice is to provide tongs for each size of crucible used and to refit them regularly on cast iron molds shaped exactly like the crucibles in use.

### Soaking Is Bad Practice

After the metal being melted reaches the pouring temperature, the charge should be removed. Holding or "soaking" the molten metal will not improve it and will materially shorten the life of the crucible. The crucible should then be charged as quickly as possible and the melting continued. When charging the crucible, care should be taken not to drop heavy metal or wedge the metal within the crucible. Two other practices leading to short crucible life are rough chipping of the inside to clean, and the occasional habit of allowing some residual metal to freeze.

Do not drag empty crucibles, hot or cold, across the floor, but handle with lifting tongs. In coke-fired furnaces care should be used in ramming coke around the crucible. Regardless of the type of furnace used, the crucible always should be centered in the furnace before firing, so that the heat is distributed evenly around the crucible wall. In melting light scrap and borings it is wise to start the heat with some heavy material which is allowed to melt and form a pool or heel. The light scrap and borings then are added gradually to the pool.

Many fluxes will attack the crucible wall, but if it is felt that a flux is necessary, it should be added after the met-

al has been melted. The author prefers charcoal as a protective cover. Avoid a highly oxidizing flame in melting and try to maintain a neutral flame if possible, or just slightly oxidizing.

Furnace linings should be maintained, and care taken to see that the relationship of space between lining and crucible is the same as with the original lining when the furnace was new. Endeavor to interest your furnace tender to give consideration to the crucible and keep an accurate record to see that he gets just as many heats as possible from every crucible. It might even be well to stimulate his interest by some type of incentive.

Until the stock situation was built up to the present level, it was necessary to take into consideration the possible salvage of crucible scrap. That procedure is not needed now except where scrap may be returned to a crucible manufacturer with reclamation facilities. Several are in position to take back their own scrap and make a fairly good recovery of graphite and silicon carbide. If it is not possible to return the scrap to the original distributor, some scrap collector may be interested to see what he can recover in the form of metallics which have penetrated the walls.

While the graphite stockpile is in a fairly comfortable position, the situation is not absolutely safe. If no further supplies come through from Madagascar, belts will have to be tightened and allocations curtailed. At present crucibles are being allocated on a 60-day basis, and it is hoped that the stockpile position in the next six months will be such that the period can be extended to a 90 or even a 120-day basis.

## Book Review

*Technical Handbook for Solving Problems in Shop or Factory*, by Edward H. Lang, supervisor of industrial education, New York State Education Department, paper; 100 pages 5 x 8 inches; published by Prentice-Hall Inc., 70 Fifth Avenue, New York; price $1.00, text edition 80 cents.

This technical handbook brings together tables of data, conversion factors and related information to supplement text books used by the thousands of young men who are entering the machine, sheet metal, electric and other skilled mechanical fields. The book will serve as a ready reference for the basic essential knowledge required in technical production jobs. Scope of the work may be noted from the following chapter headings: Arithmetic, problem solving, solving triangles, plane figures and solids, logarithms and their use, how to perform a laboratory experiment and how to arrange a report, pressure, density and specific gravity, heat and temperature, simple machines, energy work and power, velocity and acceleration, properties of metals, symbols for draftsmen, properties of sections, direct current electricity, chemical computations, the slide rule, miscellaneous tables, index.

## Industry Advisory Groups Named

Formation of industry advisory committees were announced recently by the War Production Board to represent the molybdenum and malleable iron industries. The molybdenum industry advisory committee includes: Marx Hirsch, Molybdenum Corp. of America, New York; Carl M. Loeb, Climax Molybdenum Co., New York; C. T. Ulrich, Kennecott Copper Corp., New York, and J. R. Van Fleet, U. S. Vanadium Corp., New York.

The malleable iron group includes: C. S. Anderson, Belle City Malleable Iron Co., Racine, Wis.; L. A. Dibble, Eastern Malleable Iron Co., Naugatuck, Conn.; Charles A. Gutenkunst Jr., Milwaukee Malleable & Grey Iron Works, Milwaukee; A. F. Jackson, Michigan Malleable Iron Co., Detroit; W. H. Moriarty, National Malleable & Steel Castings Co., Cleveland; K. M. Smith, Lancaster Malleable & Steel Corp., Lancaster, N. Y., and John Wagner, Malleable Iron Co., Decatur, Ill.

---

Index of foundry equipment orders for June was 413.6 as compared with 348.9 in May and 774.0 in June, 1942, according to a recent report of the Foundry Equipment Manufacturers' association.


THE FIRST NECESSITY IN CONTROL OF HARMFUL FOUNDRY DUSTS

DUST DETERMINATION
AT THE WORKING POINTS

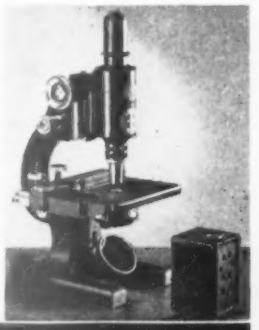
MINE SAFETY APPLIANCES CO. PITTSBURGH, PA.

M·S·A
MIDGET IMPINGER

Indispensable to correct knowledge of your dust hazards at any location in the foundry, this hand-operated, entirely self-contained instrument reliably samples the actual air of the working places—requiring no electricity or compressed air in its operation. The M.S.A. Midget Impinger is simple to use and—weighing only 9 lbs. complete with 9 impinger flasks and nozzles—is easily portable. For complete details on this standard instrument, write for your copy of our descriptive Bulletin No. CT-5.

M·S·A SPENCER
DUST COUNTING MICROSCOPE

Counting dust particles in the collected samples is the next step—easily accomplished with this specially designed microscope. The instrument is precisely constructed of quality materials, and, although inexpensively priced, possesses high-grade optics and accurate adjustments, which ideally adapt it for the job. Request Bulletin No. CT-5.



MINE SAFETY APPLIANCES CO.
BRADDOCK, THOMAS AND MEADE STS. · PITTSBURGH, PA.
*Representatives in Principal Cities*

## Safety Council Will Meet in Chicago

National Safety Council will hold its annual congress in Chicago on Oct. 5, 6 and 7, with meetings scheduled for the Sherman, LaSalle and Morrison hotels. Members of the council are classified in 26 membership sections, and each will conduct its own congress program. One feature will be a labor and safety session for industrial leaders held on Oct. 7 at which Daniel S. Ring, director, Division of Shipyard Labor Relations, U. S. Maritime Commission will preside, and some of the nation's outstanding labor leaders will participate. At another session on Oct. 5 W. A. Patterson, United Airlines Transport Corp., will discuss "Why Top Management Should Initiate and Support Accident Prevention".

Wilfred Sykes, Inland Steel Corp., will address the Metals Section on Oct. 5 discussing "Safety for Production for Victory". A safety training session on Oct. 7 will be devoted to a discussion of correlating safety with vocational training. A "Seeing for Safety" session on Oct. 6 will cover all phases of vision and visibility. A subject session on "Off-the-Job Safety" on Oct. 7 should attract a large audience since more lost time is charged against workers as a result of accidents suffered while off the job than while at work.

## Gray Iron Society Plans Meeting

Annual meeting of the Gray Iron Founders Society, Cleveland and Washington, will be held at the Netherland Plaza Hotel, Cincinnati, Oct. 5 and 6, according to a recent announcement of W. W. Rose, Executive vice president. On the first day foundrymen interested in special types of castings, such as machine tools, automotive, municipal, etc., will meet and discuss common problems. These individual group meetings not only will consider present problems, but will discuss the factors which will influence future trends in the industry. The second day will be devoted to a formal program of addresses, such as was presented so successfully in Cleveland a year ago. Speakers will include representatives from government and industry. The luncheon meeting will feature an outstanding speaker, and the annual business session will terminate the meeting.

The complete program will be presented in the October issue.

## How Foundry Church Derived Its Name

Of interest to many readers of THE FOUNDRY should be the origin of the name of the Foundry Methodist Church, one of Washington's leading religious institutions. When the British set fire to Washington in the war of 1812, one of their objectives was the destruction of a foundry in nearby Georgetown where a British-born American patriot named Henry Foxall was manufacturing supplies for the American army.

Foxall was not only a foundryman but a Methodist local preacher. He solemnly vowed that if his foundry were preserved "in order that it might continue to furnish the instruments of war to make tyranny tremble," he would build a Methodist chapel. A terrific electrical storm halted the British and before they were in a position to raze the foundry American reinforcements were brought up from Virginia, thus ending the threat. While the church was being built Bishop Francis Asbury settled a debate as to its name by deciding on the Foundry Methodist Church, not only in tribute to the foundry operated by Mr. Foxall, but also because John Wesley was preaching in an abandoned foundry in London.

Numerous occupants of the White House have worshipped at Foundry Church, and it was the only church of which Abraham Lincoln was a member. Thirty-nine years ago, having outgrown the original edifice, the congregation erected the beautiful stone church now located at 1500 Sixteenth street, N. W.


CITIES SERVICE FOUNDRY PRODUCTS

FOR ALL USES!

CITIES SERVICE OILS

ONCE-ALWAYS

THE BUCKEYE FOUNDRY COMPANY
Cincinnati, Ohio
Unfinished core made with
"Delco Core Oil 7 Z"

CORE ROOM AT WATKINS, INC.
Wichita, Kansas

AGAIN, in War as in Peace, Service to a Nation, Cities Service Oil Company and their staff of engineers are at the service of vital production plants of the nation. The products manufactured for foundry work by Cities Service insure service, quality and maximum dependability. Cities Service carries a complete stock at hundreds of distribution points throughout the territories shown below.

CITIES SERVICE OIL COMPANY

OFFICES IN CHICAGO, CLEVELAND, DETROIT, ST. PAUL, TULSA, KANSAS CITY, CEDAR RAPIDS, FORT WORTH, SHREVEPORT, MILWAUKEE, TORONTO, NEW YORK

# CAST NE STEEL GEARS

## Substituted for Forgings

By AL ZWALD
Chief Engineer
Willamette Hyster Co., Portland, Ore.

DUE to suddenly increased production demands on one of our larger size hoists, we were faced with an apparent shortage of alloy steel forgings for transmission gears.

Overcrowded production schedules of the manufacturer regularly supplying us with these forgings didn't seem to allow him to meet this extra demand in time to fill our production requirements. Time was too short to make new dies and place orders with another forge shop. Therefore, we decided to investigate the possibility of using alloy steel castings to fill the possible gap.

### Experiment With Casting

A local electric steel foundry was consulted. Its management and metallurgical staff agreed to experiment with casting these gear blanks of an alloy steel similar in chemical composition to NE-9437. To do this required making a special heat as no alloys with satisfactory chemical analysis were regularly produced.

A total of five gears were involved with four being distinctly different in shape. Weights varied from 25 to 65 pounds each, totaling approximately 270 pounds per set in the rough. All were to be cut to three-quarter stub tooth form. Outside diameter varied from approximately 6 to 9½ inches and face widths from 1½ to 2¼ inches. They were to be heated and oil quenched after machining and then drawn to a hardness of 48 to 54 Rockwell C.

The maximum static unit stress on the teeth of the smallest gear is 60,000 pounds as determined by the Lewis formula using a speed factor of 600 divided by (600 + v). Under normal conditions this stress would only be approximately about 5 per cent of the unit's operating time. On over 200 machines in the field that have operated continuously under severe working conditions in redwood, fir and other logging operations, no gear failures have been reported.

Gear steels previously used in these machines with equally successful results were SAE-4140, 4340 and 3140.

To establish a practical foundry procedure for obtaining flawless homogeneous-castings, these gears were re-designed, making sections as uniform as possible. Special pattern equipment was made and experimented with to get a high grade product. The most difficult job was a bevel pinion 6 inches outside diameter cast integral with the drive shaft which was 2¾ outside diameter by 14 inches long (finish sizes). A fully cored mold was used for this part. The other four were cast in dried sand molds. Gates and risers were made large to insure proper feeding of hot metal and eliminate shrinking faults.

Experimental castings were then made using a somewhat lower grade of alloy steel regularly made at this foundry. These were machined complete and heat treated to check their soundness and obtain an approximate comparison of hardening ability and size growth due to heat treatment.

Radiographic examination for possible internal flaws showed a shrinkage area just below the root diameter on the large size of the cluster gear. Larger risers corrected this on subsequent castings. No internal flaws were found in the four remaining parts.

Enough data had thus been gained to warrant making up a heat of the special alloy steel intended for these gears. The capacity of the first electric furnace used was 2½ tons. Due to the large risers, the proportion in weight of castings produced to hot metal poured was 45 per cent.

The chemical analysis of this heat checked as follows: Carbon 0.39 per cent, manganese 1.04 per cent, sulphur 0.048 per cent, phosphorus 0.04 per cent,

From *Steel*, Aug. 2, 1943.

DEMPSEY FURNACE

DEMPSEY
INDUSTRIAL
FURNACES

Over- and under-firing, as used by Dempsey in Car Type Furnaces, eliminates the "cold center" so inherent in the plain direct-fired furnace. In addition, it supplies faster heat, saves time and produces excellent uniformity. Illustrating the range of operations for which they are suitable is a single unit now being used for production at temperatures as low as 500°F., at 1200°F. and also giving good uniformity at 1800°F. (name on request). Write for bulletin showing range of standard sizes.

The Dempsey staff of heating engineers is at your service at any time. Without obligation, they will be glad to consult with you and make recommendations based upon your own heat treating problems.

DEMPSEY INDUSTRIAL FURNACE CORPORATION
Combined 50 years' experience building Dempsey and Gilbert & Barker Furnaces for all heat treating needs
SPRINGFIELD • MASSACHUSETTS

Table I—Physical Properties of Cast NE-9437

| Draw Temp. Degr e F. | Tensile Strength P.S.I. | Yield Point P.S.I. | % Elong. In Z | % Red. of Area | Brinell Hardness | Izod Impact |
|---|---|---|---|---|---|---|
| 800 | 180800 | 167950 | 6.5 | 10 | 293 | 13.5-14-13.5 |
| 900 | 164900 | 144750 | 10.5 | 15 | 277 | 19.5-20-20 |
| 1000 | 147900 | 131750 | 13.5 | 30 | 262 | 25-25.5-25.5 |
| 1100 | 140000 | 122250 | 17 | 33 | 248 | 35-35.5-34.5 |
| 1200 | 117350 | 100200 | 21.5 | 39 | 228 | 47-48-47 |
| 1300 | 110600 | 92850 | 23 | 46 | 207 | 50.5-50-49 |

Table II—Results of Tension Tests

| Specimen No. | Tensile Strength P.S.I. | Yield Point P.S.I. | % Elong. | % Red. | Brinell |
|---|---|---|---|---|---|
| 1 | 171000 | 164000 | 8 | 14 | 340 |
| 2 | 163250 | 154000 | 12.5 | 22.4 | 340 |
| 3 | 165600 | 158000 | 12.5 | 26.5 | 332 |


Don't miss that 7th point

IN THE LIST OF

MOGUL

QUALITIES

1 *Mogul* – the perfect green and facing bond.

2 *Mogul* replaces some clay and develops high permeability.

3 *Mogul* works perfectly with

*Core Oil* – because it decreases drying time and produces smooth, clean cores.

Pitch or Resin – because cores can be handled while still warm.

4 *Mogul* – because sharp sand can be widely used.

5 *Mogul* – because smoke and gas are greatly reduced.

6 *Mogul* saves binder costs – drying time – cleaning costs.

7

*MOGUL* CAN BE USED IN CORES WHERE BOTH *GREEN* AND *DRY STRENGTH ARE REQUIRED* . . . .

*Remember – By using Mogul you will increase the core maker's production, the core oven production, the foundry good casting yield and gain low casting cleaning costs.*

CORN PRODUCTS SALES COMPANY

17 BATTERY PLACE · NEW YORK


nickel 0.54 per cent, chromium 0.49 per cent, molybdenum 0.28 per cent.

Cloverleaf type test bars cast and heat treated in approximately 1¼-inch squares and rounds were used in machining tensile and impact test bars. The physical properties obtained are shown in Table I when the work was quenched in water from 1550 degrees Fahr. and drawn, as indicated, 4 hours.

These compare quite favorably with available figures from an eastern rolling mill on one heat of NE-9442 steel which checked as follows: Carbon 0.40 per cent, manganese 1.18 per cent, silicon 0.24 per cent, nickel 0.40 per cent, chromium 0.40 per cent, molybdenum 0.18 per cent.

After quenching in oil from 1510 degrees Fahr. and tempering at 1100 degrees Fahr., physical property tests of 1¼-inch square specimens showed a tensile strength of 141,000 pounds per square inch, yield-point of 126,500 pounds per square inch, elongation of 18.5 per cent, reduction in area of 57.3 per cent, hardness of 277 brinell and 59 Izod impact value.

As was expected, the ductility of the rolled steel was higher. However, the castings can be judged as satisfactory in this respect.

Independently from the laboratory tests shown on the cast steel heat, additional tensile test specimens were machined and heat treated as follows: Rough turn 1¼-inch bars to 1-inch diameter, heat to 1550 degrees Fahr., quench in oil, draw at 1000 degrees Fahr., 1½ hours for specimen No. 1, 4 hours for specimens Nos. 2 and 3, finish machine to standard tensile test bar.

### Improve the Ductility

The tempering time of 4 hours improved the ductility as shown on bars Nos. 2 and 3 in Table II with but negligible loss in hardness.

Machining of the cast gear blanks progressed well with good results reported by the shop as to cutting qualities, feeds and speeds. Out of 14 castings, we had no rejections due to quality of the material. From 0.010 to 0.020-inch stock was sufficient for the finish grind operations after heat treatment.

Heat treating was done in an electric furnace to the following specifications: Quench in oil from 1550 degrees Fahr., temper at 400 to 425 degrees Fahr. (4 hours). Hardness readings averaged 52 rockwell C about $\frac{1}{16}$-inch from the tooth flank near the pitch line to 49 at the root diameter as compared to 53 and 50 rockwell respectively on gears made from forgings.

Average growth in outside diameter due to heat treatment on a 9½-inch diameter gear was recorded as 0.005-inch on the limited number of castings on hand as against 0.008-inch on SAE-4140 and 0.010-inch on SAE-3140, value obtained from several hundred gears made from forging stock.

The supply of forgings has improved in the last few weeks to such an extent to take care of our production require-

ments, giving us an opportunity to test two hoists, equipped with the heat-treated cast steel gears under actual working conditions. These have now been in operation for about 10 weeks without failure or undue indication of wear.

An analysis of costs showed the castings to be about 10 per cent higher than forgings (disregarding pattern or die equipment) and the finished gears about 15 per cent above the finished product made from forgings. Of course these figures might vary considerably if a larger number of heats and castings had been checked. However, with the proper care in controlling the chemical properties, and foundry molding and pouring practice, a good uniform casting should be obtainable.

Making such steel castings by the centrifugal process would undoubtedly produce a more homogeneous and refined product. The beneficial effect of improved metal flow lines and working of the fibers produced in rolling and forging will be lost but might be offset to some extent with scientific developments in the art of casting alloy steels.

We are confident that under similar loads, working conditions, similar size and shape of parts as described herein, cast alloy steel gears, heat treated to the proper hardness can be used successfully, particularly where production quantities do not warrant the expense of making forging dies.

## Metal Congress To Be in Chicago

National Metal Congress will be held at the Palmer House in Chicago during the week of Oct. 18 in co-operation with the American Society for Metals, American Welding Society, Wire Association, and the Iron and Steel and Metals Divisions of the American Institute of Mining and Metallurgical Engineers. One of the features of the congress will be the War Conference Display which will be devoted to the increase of war production in the metal industry, to conservation of metals, and to postwar planning. Technical sessions of the American Society for Metals will be held at the Palmer House, those of the American Welding Society at the Morrison Hotel; the Wire Association at the LaSalle Hotel, and those of the A.I.M.E. at Hotel Sherman.

## Will Give Lectures In Brazil

Advanced practices in applications of metallurgical science in the United States will be communicated to Brazilian scientists and industrialists during the coming year through a technical educational project established at Escola Politecnica of the University of Sao Paulo. Four outstanding scientists-educators have been appointed to give lectures on fundamental metallurgy over a period of a year; each to remain in residence for 3 months during the extent of his lecture series. Project is financed jointly through the office of Nelson A. Rockefeller, co-ordinator of Inter-American Affairs and Escola Politecnica, and is administered by Stevens Institute of Technology.

First lecturer, Dr. A. Allen Bates, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., began his duties at University of Sao Paulo on July 29. He will be followed in turn by Dr. Robert F. Mehl, Carnegie Institute of Technology, Pittsburgh; Prof. Arthur Phillips, Yale University, and Prof. Gregory J. Comstock, Stevens Institute of Technology. Dr. Bates will lecture from the viewpoint of industrial research and development; Dr. Mehl on physical metallurgy of iron and steel; Prof. Phillips on nonferrous metallurgy, and Prof. Comstock on powder metallurgy.

## 90-Year History

An interesting booklet "90 Years of Industrial Pioneering" recently published by the Swan-Finch Oil Corp., traces briefly the history of lubrication, history of the Swan-Finch organization and developments of that firm in the field of lubricants and core oils.

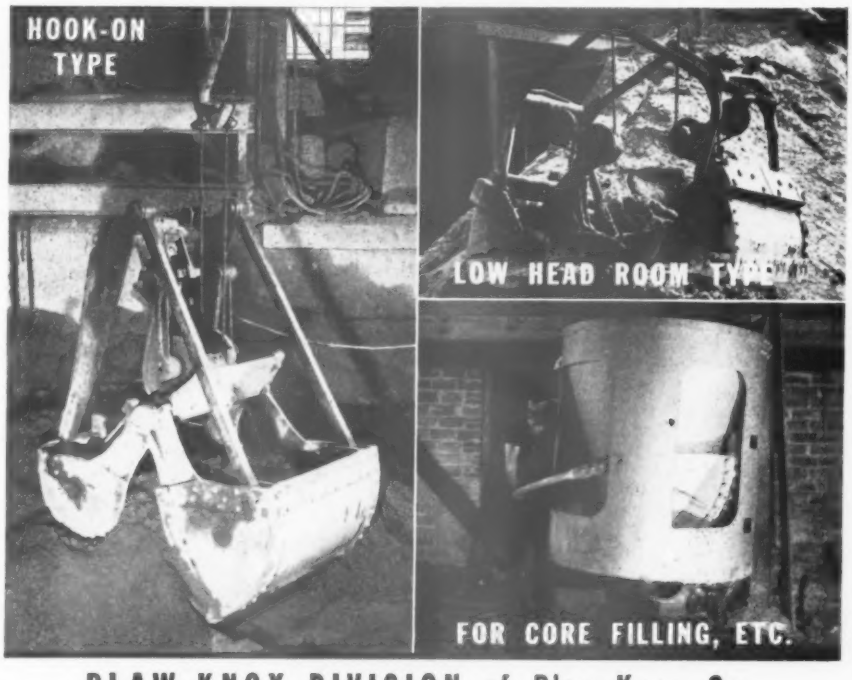

# Blaw-Knox "hook-on" BUCKETS

***take the least of your crane time...***

Blaw-Knox Foundry Type Single Line Buckets are made *convenient* for you—they can be hooked on or off the crane block as required. They operate easily and they last long.

Blaw-Knox has a wide variety of foundry clamshell buckets to choose from—considering the available operating clearance, crane load capacities, working space limitations, character and state of material to be handled, safety features.

See Blaw-Knox Buckets in Catalog No. 1696—yours for the asking.




**BLAW-KNOX DIVISION of Blaw-Knox Co.**
2207 FARMERS BANK BUILDING PITTSBURGH, PA.
NEW YORK • CHICAGO • PHILADELPHIA • BIRMINGHAM • WASHINGTON

# CASTINGS POURED IN CORES

(*Continued from page* 99)

poured from each heat for subsequent analysis.

Melting furnaces are tapped into bull ladles which are mounted on buggies for wheeling to the pouring stations. A cement floor throughout the foundry facilitates this transfer. In pouring the head casting, two 150-pound ladles are used to pour simultaneously through two gates located on opposite sides of the core and midway its length. Runners located at the base of the top core section and extending its full length assist in distributing the metal. The upper crankcase requires two 350-pound ladles for pouring.

After pouring and when sufficient metal has been added to the risers, a sheet metal hood and stack is placed over the core to induce smoke and fumes developed by contact of the molten metal with the sand to rise well above the heads of the operators. Exhaust fans located near the plant ceiling pick up these gases and remove them quickly.

Castings are trucked outside the plant after solidification, broken out of the core sand, and when sufficiently cooled are returned to the shakeout and then sand blasted, as shown in Fig. 12.

Removal of gates and risers is a rather extensive operation, but the time required has been reduced considerably from original practice by several time-saving procedures. Risers on both the head and upper crankcase do not project from the surface of the castings in such a way that they can be removed by the usual sawing method. The alternative of chipping proved to be a laborious process, involving about 35-hours' time for each crankcase. A suggestion by Ed Blakeley, one of the workers, (the idea won him a cash prize) to use electric welding to cut away the risers from the upper crankcase provided the answer to the problem. Using reversed polarity on the unit, most of the excess metal is removed in about 30 minutes, with another hour and a half required to chip away the remaining slight projections at the base of the risers.

### Drill and Chip Away Risers

Risers on the cylinder heads are removed by drilling and chipping. The head is clamped on a radial drill press, and a hole slightly smaller than the diameter of the risers is drilled through each of them. The thin shell that is left is easily chipped away. This drilling operation also was speeded up by the prize-winning idea of another worker, Charles Rice. His suggestion was to build a duplicate drill table on the press, so that one casting could be mounted while the risers of another were being drilled.

After the gates and risers have been removed the castings are heat treated, the stress relieving operation consisting of heating for 5 hours at 550 degrees Fahr. A final sand blasting precedes a careful inspection in which dimensions are checked by targeting. In addition, the castings are tested hydraulically at 60 pounds per square inch for the wheel case and 80 pounds for the head. Fig. 14 illustrates use of a target gage which quickly and accurately checks the numerous dimensions of the upper crankcase. This fixture was designed and built by the Acme company.

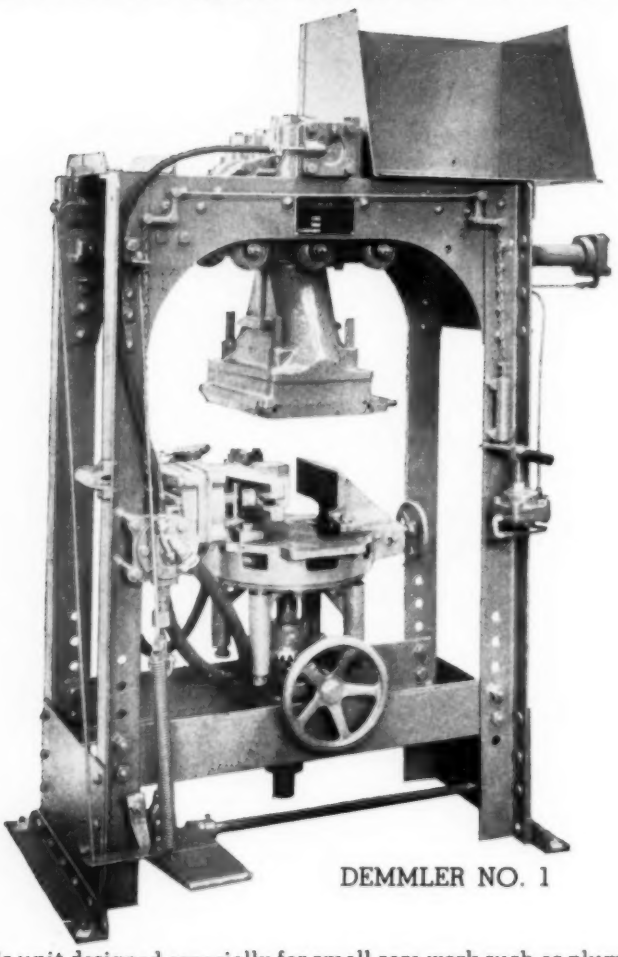
Gates, risers, rejected castings, etc., are remelted in a gas-fired reverberatory furnace of 18,000 pounds capacity and poured into ingots for subsequent reuse. A continuous sloping hearth permits the furnace to be charged at the rear and tapped at the front. Cryolite is used for the flux.

---

Production of malleable iron castings in June, 1943, according to a report of the U. S. Department of Commerce, Bureau of Census, was 69,092 tons as compared with 69,959 tons in May and 59,990 tons in June 1942. Orders booked during the month totaled 83,815 tons as compared with 55,032 tons a year ago.

★ ★ ★ SINCE 1911 ★ ★ ★

DEPENDABLE **CORE BLOWING** EQUIPMENT



DEMMLER NO. 1

**This unit designed especially for small core work such as plumbing goods, electrical fittings, stove burners, valves and small pipe fittings. Ideally suited to quantity core production on all types of small brass, malleable, and gray iron work. Detailed specifications on this or other models on request . . . a type and size for every core blowing need.**

**WM. DEMMLER & BROS.**
KEWANEE, ILLINOIS

**CORE BLOWERS *Exclusively***

# ANNUAL MEETING OF BRITISH FOUNDRYMEN

(*Continued from page* 100)

tiring president, was elected as representative of the institute on the Council of Iron Foundry Associations.

Daniel Sharpe then delivered his presidential address. He started by saying that the foundry industry is a combination of science and art, and that decisions have to be taken to meet emergencies which, if not acted upon at once, may mean scrapping valuable work. He pointed out that, while in the past individuals had little opportunity of comparing their practice, the Institute of British Foundrymen had changed this by providing lectures, discussions and works visits, and the technical press has also done much to widen foundrymen's experience. He said: "The structure of the present foundry practice has a solid foundation on the records of the past, while the practice of the future is dependent on the performance of the present generation, that means you and me. We must treat this trust with great care if we are to produce a lasting prosperity for the generation to follow us."

### Tighten All Requirements

The president then referred to modern methods of production which make for speed and economy, and provide greatly improved working conditions. He pointed out that the ever increasing up-grade in specifications had made the foundry industry tighten up all requirements in strength, lightness, rigidity and exact dimensions.

Dealing with conditions of work, he said he had seen foundries, at home and abroad, where conditions were still repulsive in every detail. This type of foundry should be put out of action either by regulation or competition. "The man behind the machine", he said, "is much more valuable than the machine and it is the finding and training of such men that is our most important problem." The education and training of the young foundryman should be one of the major concerns of leaders of the industry. He also mentioned that the increase of the use of mechanical aids has made it necessary to have engineers in the management of the foundries.

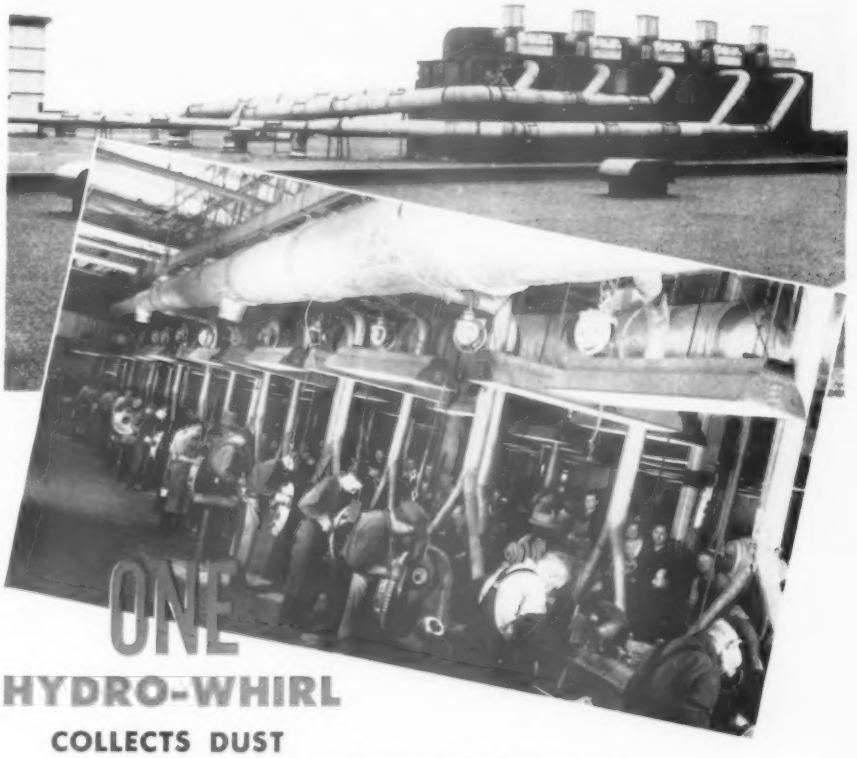
Mr. Sharpe then reviewed briefly the fields in which changes of practice had been made in the past 40 years, and he mentioned new techniques in sand preparation; the introduction of power molding, of which he was one of the pioneers; modern methods of cleaning and fettling; metallurgical control, and accurate costing. He ended by saying that the intense conditions of production due to abnormal war demands will need to be watched carefully when the change over to commercial life returns, and he suggested that the services of the Technical Committee of the institute would continue to be of the greatest value in peace time.

The rest of the morning was devoted to the presentation of the Edward Williams lecture by Dr. S. F. Dorey, chief engineer surveyor, Lloyds Register of Shipping, who chose for his subject: "Contribution of the Steel Founder to Marine Engineering."

In the afternoon, ten papers were presented and discussed in three separate sessions. In the steel session, held as a joint meeting with the Iron & Steel Institute, the following three papers were discussed together:

"Hot Tear Formation in Steel Castings," by Charles W. Briggs, technical and research director, Steel Founders' Society of America, Cleveland, in which the author reviewed how steel casting producers in the United States are set up to find hidden internal hot tears and those tears that come to the surface by x-ray and gamma-ray, and other methods. This paper was the exchange paper of the American Foundrymen's Association for this year.

"Continuous Production of Manganese Steel Castings from the Tropenas Converter", by L. W. Bolton, British Cast Iron Research Association, and J. Hill, associate member of the institute, in which the authors discuss the use of the


COLLECTS DUST FROM

EIGHTY

SEPARATE MACHINES

BUY WAR BONDS

Hydro-Whirl Dust Collectors are engineered to meet any requirements—from 700 to 100,000 C.F.M.—designed for all forms of metal dust (magnesium, aluminum, iron) created from grinding, buffing, polishing, or sanding. The dust is "water-whirled" out of the air and is knocked down into a tank below, from which it is removed periodically as sludge by conveyor.

HYDRO-WHIRL

INDUSTRIAL SHEET METAL WORKS

NEW NAME → PETERSON-DALTON, INC.

625 EAST FOREST AVE., DETROIT 1, MICH.

MFRS. HYDRO-WHIRL DUST COLLECTORS AND SPRAY BOOTHS — INDUSTRIAL OVENS, MECHANICAL WASHERS AND VENTILATION SYSTEMS

tropenas converter for making manganese steel castings. This converter, usually of a side-blown type, is used in conjunction with the cupola. A dead mild steel is produced, to which is added the requisite quantity of molten ferromanganese, which has been melted separately, either in a crucible or in a small cupola.

"A Wartime Steel Foundry—Some Problems and Developments," by E. D. Wells, member, and A. Johnson, associate member. In this paper the authors describe methods used in a foundry specially organized for war production of steel castings. It is pointed out that the need for improving both the quality and quantity of output to meet wartime requirements has resulted in many practices being adopted that previously were considered impossible or at least inadvisable.

The American exchange paper was to have been presented, in the absence of the author, by P. C. Fassotte, technical director of steel castings, Iron & Steel Control, but owing to an indisposition Mr. Fassotte was unable to attend and his notes were read by V. C. Faulkner, editor, *The Foundry Trade Journal*.

After commending the author for the valuable series of contributions he has made to the technique of steel founding, the commentator said that of all the defects to which steel castings can be subject, hot tearing is the most pernicious, the most insidious, the most difficult to locate and the most awkward to cure. For many years we were not fully cognizant of this defect and were only aware of it when it was present in a blatant manner, say, in the form of a gaping gash on the surface of the casting. Only too often were we unaware of the less discernible, fine, hairline crack, and only with the advent of the magnetic test and x-ray and gamma-ray investigation were we to be in a position of measuring the extent to which our products suffered from hot tearing. Prior to these methods of investigation we were dependent on crude and inadequate processes of detection, such as sandblasting after immersion in an oil bath, suspending castings on wires and relying on resonance to give an indication of soundness, or as a final resort, the always unfortunate method of sectioning castings and thereby destroying them. It is therefore fortunate and timely that in the author's opening paragraphs he sketches the development of the non-destructive methods of testing in the United States.

### Explains Hot Tears

As the author explains, the formation of hot tears cannot be dissociated from the presence of hindered stresses and the analysis and origin of these stresses is extensive and convincing. The importance which is ascribed by the author to the ductility of the steel, which may even exceed the influence of strength at high temperature, is academically most interesting. To what extent, however, we can apply this fact is somewhat doubtful, as relative ductilities and strengths are bound to vary rapidly during the solidification period, and, in any case, are beyond calculation.

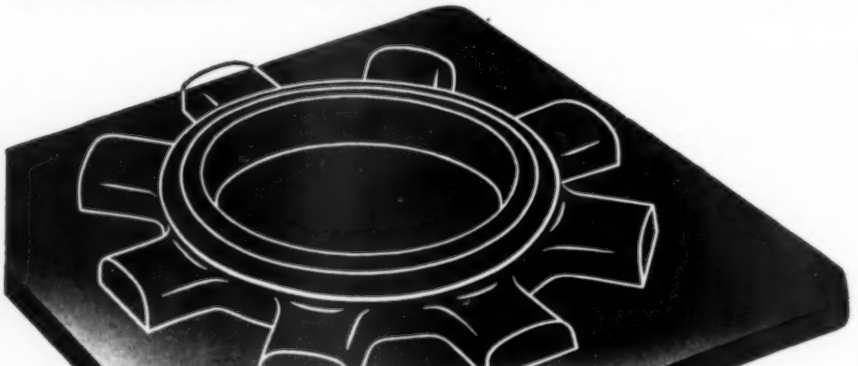
Equally beyond calculation is resistance to contraction due to casting design, and nature of molding materials. Certain sands have been known to cause more tearing than others. Mention might be made of the means by which the resistance of the mold to contraction can be lessened and the practice often seen on the Continent of pouring water in pre-arranged cavitites in the mold immediately after pouring, with a view to loosening the sand and prevent it from hindering contraction.

It was mentioned that in one British foundry, a few months ago, a run of hot tears was experienced at the inside of a flange at the end of a particular casting. The matter was investigated, and the results of the experiments are compared with the conclusions of the author of the paper:

1. Both basic and acid steels were tried. Generally speaking, the behavior was the same, though results with basic steels were slightly better.
2. The carbon range of the steels used was between 0.2 and slightly above 0.3 per cent. Tears were equally persistent with all the carbon contents.
3. The sulphur variation in the steels employed was between 0.02 and


*Speed up Production with*

**TRANSITE Core Plates**



**TODAY, when maximum production in minimum time is so vital, Transite Core Plates can be of invaluable assistance. These core plates are smoothly sanded trays of asbestos and cement, specially compounded and treated for holding cores during the drying or baking processes. Transite Core Plates have earned an enviable performance record in their many years of service in the making of cores for brass, aluminum, gray iron, malleable iron and steel castings. For complete details, write today for brochure No. PP-10A. Johns-Manville, 22 East 40th St., New York 16, N. Y.**

**CHECK THESE 8 ADVANTAGES**

1. Light Weight
2. Corrosion Resistant
3. Less Breakage
4. Low Warpage
5. Easy to Clean
6. Strong and Durable
7. Economical
8. Non-Critical Materials

JM

Johns-Manville

**TRANSITE Core Plates**

0.03 per cent with no noticeable difference in results.

4. The phosphorus variation, between 0.02 and 0.04 per cent gave no continued different behavior.
5. The steels were examined for nonmetallic inclusions without yielding any information. Sections of defective castings have, however, been sent to the author and he may have a different opinion on this point.
6. The widest practical range of pouring temperatures gave no indication that the casting temperature had anything to do with the formation of this particular hot tear.
7. Different molding media and hardness of ramming were tried without any result.

The foundry in question agrees with the opinion of the author that steels with low and medium carbon content do not behave differently from the point of view of hot tears, and with the contention that no special importance need be attributed to the pouring temperature. The temperature gradients in the metal did not seem to be affected in any material way by a variation of pouring temperature; it took an internal chill to upset this temperature gradient and put an end to the trouble.

### Conclusions Not Invalidated

After these extensive experiments the foundry was inclined to attribute the principal reason for the trouble to insufficient fluid head of metal at the moment of solidification. In view of the heads provided, however, this explanation may not appear too convincing and it will be interesting to have the author's opinion. It will be noted that none of the author's general conclusions are in any way invalidated by these tests. The author's paper has done more. It has enforced clear thinking on an intricate subject.

The discussion on the paper by Mr. Bolton was opened by Malcolm Brown, past president, Sheffield Branch, who said he thought the Tropenas converter had a big future and there was nothing to beat it for ordinary carbon steel. He recommended the use of conditioned air. He asked what was the advantage of the whirl gate head over the L head. Mr. Bolton replied that in regard to air blast control it is oxygen that is wanted and the oxygen being used should be measured. With regard to the whirl head this could be used at any portion of the casting, whereas the L head is usually at the top.

Dr. Dadswell, Sheffield Branch, said he thought the whirl head gate was one of the greatest advances in feeding in recent times, but there is not always a proper conception as to how it works. The main point is the manner in which the gate is attached to the casting.

Colin Kain, referring to the lining of converters, said he believed in ramming hard and keeping the air dried; he had thus obtained 110 to 120 melts without relining the vessel. Referring to the whirl gate head, he said results had not been very good with multiple castings in green sand. He emphasized the necessity of maintaining plant and equipment, saying it was easier, in present circumstances, to find people to do repair work than maintenance work.

W. H. Salmon, Sheffield Branch, referring to the paper on hot tear formation, said a test bar should be easy to mold and should be designed to give numerical results easily. He suggested that better steel would be obtained by increasing the silicon and reducing the carbon. He agreed with the author that chills should be placed in dangerous places. He said there should be more liaison between the designer of the casting and the founder.

C. D. Cooper, Lancashire Branch, said hot tears were often due to carelessness. Dr. Dadswell drew attention to internal hot tears. F. W. Rowe, Sheffield, pointed to the influence of steelmaking practice on the occurrence of hot tears. Mr. Salmon pointed out that when internal hot tears existed in the ingot the blame did not attach to the founder.

In another session the following papers were discussed: "Some Aspects of the Production of Malleable Iron Castings," by J. Roxburgh, East Midlands Branch. "Spectrographic Analysis of Cast Iron," by F. B. Ling, J. McPheat, Scottish Branch and J. Arnott, Scottish Branch. "Meeting the Raw Material Supply Po-


HAUSFELD

ALUMINUM MELTING FURNACES

For All-Out War Production

ALL TYPES AND SIZES

SINGLE AND MULTIPLE BURNERS

GAS AND OIL FUEL

FASTER MELTING • UNIFORM ANALYSIS

LONGER LIFE FOR CRUCIBLES AND LININGS

Hausefeld Furnaces are available for melting all non-ferrous metals and their alloys. Tested before shipment.

The Campbell-Hausfeld Co.

300-320 MOORE ST. HARRISON, OHIO

sition," a report by the Cast Iron Subcommittee of the Technical Committee, "Industry and Education," by G. L. Harbach, East Midlands Branch and R. Horton, associate member.

Three papers were given in the session on nonferrous metals: "Effect of Casting Conditions on the Properties of a Magnesium Die Casting Alloy," by Prof. W. R. D. Jones, of the Wales & Monmouth Branch, University College, Cardiff. "Report on a Copper-Antimony-Nickel Gear Alloy," by the Nonferrous Subcommittee of the Technical Committee. "A Method of Correlating Foundry Procedure and Quality of Castings," by H. G. Warrington, production metallurgist, High Duty Alloys, Ltd.

## USING ALLOYS EFFICIENTLY

(*Concluded from page 109*)

the first time.

To further the efficient use of aluminum scrap in castings, the accompanying chart has been prepared by the WPB to indicate possible alloy substitutions by which greater amounts of scrap can be utilized. In this chart, sand and permanent mold casting alloys are considered separately, and possible substitutions are suggested by four progressively lower purity alloy classifications. In the chart these are graduated from left to right, those on the left requiring the greatest amount of primary ingot, and on the right permitting the greatest use of scrap. In addition, the accompanying table, prepared by WPB, translates the commercial specifications into the approximate equivalent specifications approved by various government and engineering groups such as Federal, Army Ordnance, Navy Aeronautical, SAE and A.S.T.M. Each of the four headings in the chart also indicates the type of material that may be employed most advantageously and from what sources it preferably should be bought.

The nomenclature used is that most common in the industry and for clarity, nominal percentage compositions are also shown with each alloy on the chart. Alloys enclosed by a double line can be heat treated, those by a single line cannot. In addition, a cross reference to several common specifications which are approximately equivalent is shown in the accompanying table.

The WPB states that in using this chart, two things should be remembered. First, if a satisfactory, less-critical substitute material in some other field can be used, even the lower grades of aluminum should be avoided. Second, if high mechanical properties, specific physical properties, maximum resistance to corrosion or particular casting characteristics inherent in an alloy toward the left of the chart are not essential, it is a contribution to the war effort to use an alloy nearer the right.

With respect to special characteristics, alloy No. 142 occupies a unique position. Because of its nickel content, it is not a desirable substitute for other alloys, while for certain high temperature uses suitable alternate materials are not available. It should be used only where its unique characteristics are essential.

In reading the chart it should be noted that, because of directives issued by WPB, some of the alloys in the second column are available from the secondary smelters only in limited quantities.


"BRANFORD"

SPEED—MORE SPEED is the watch-word in the foundry today. All through the modern foundry, every possible improvement is used to increase production. "BRANFORD" Labor Saving Equipment is speed producing and includes—

THE "BRANFORD" FLASK RAPPER

Made in sizes from 2" piston diameter to 8" piston diameter.

Entirely eliminates damage to flask.

*Send for Questionnaire.*

5" Flask Rapper shaking out copes 5' dia. to 10'6" x 20'0" x 12" deep.

*Write to Dept. 5 for Bulletin "E" "Branford Vibrators & Accessories"*

NEW HAVEN VIBRATOR CO.

NEW HAVEN 7, CONNECTICUT


## Changes Name to Kennametal Inc.

McKenna Metals Co., Latrobe, Pa., has been succeeded by Kennametal Inc., a corporation of Pennsylvania. The personnel, management, products and policies remain the same, the change in name being made to conform to the trade name of the company's cemented carbide.

Farris Engineering Co., Ridgefield, N. J., has established a new division to handle valve repairs. This division is fully equipped to speedily recondition, reconstruct and test all types of reducing, relief, and standard or special valves and control apparatus.

# USE GRAY IRON FOR TRENCH MORTAR BOMBS

(*Continued from page* 108)

vision of runners combined with "blind risers" or "shrink bobs," (Fig. 3).

Certain coupling castings present special difficulty in the foundry and have, therefore, been made in low-phosphorus, low-carbon irons, in the main because this type of casting (Fig. 4) is essentially a compact mass of metal which must not only be machined on all its faces, but which is subject in most cases to operations which will reveal any suggestions of porosity in its interior structure. This example shows how one foundry, by careful attention to methods, has been able to raise the phosphorus content of the mixture employed for these castings. The foundry from which this example is taken has a very large proportion of its output in castings of this type, and until comparatively recently the iron used was of the order 3.0 per cent total carbon, 0.25 per cent maximum phosphorus, with silicon variations according to size and section. The castings vary in weight from 14 to 1680 pounds, the majority falling between 100 and 750 pounds.

### Experiments Were Successful

Experiments were conducted to ascertain the possibility of using a higher phosphoric iron with, incidentally, a higher carbon content. These experiments were successful, the final analysis for one size of casting being 3.28 per cent total carbon, 1.27 per cent silicon, 0.58 per cent manganese, 0.63 per cent phosphorus and 0.14 per cent sulphur, with a tensile strength of 16 tons (35,800 pounds) per square inch on the 1.2-inch bar. Equally successful results were obtained on other sizes of castings, modifying the silicon content as necessary.

The successful adoption of the higher phosphorus iron depends on the running technique employed, as illustrated in Figs. 5 and 6. Rod feeding never is used, except with unusually long bosses, and then only in conjunction with the self-feeder on the rim. It is of interest to note that in the majority of cases the bolt holes are bored out of the solid and very rarely do these show any signs of porosity.

The method of production necessitates the use of hot metal and relatively slow pouring, and thus the molds have to be strongly constructed, particularly the top part. It will be observed that in this case it has been possible to use an iron with 0.3 per cent phosphorus above normal practice, thus reducing the steel consumption without prejudicial effect on the castings produced.

Centrifugal casting, where it can be applied, provides an admirable means of producing sound strong castings from high-phosphorus cast iron. It is, of course, generally applied to simple castings, such as cylinder liners in which phosphorus of 0.9 per cent is used regularly, and it can also be applied in conjunction with composite assemblies where centrifugally cast bushes or liners may be incorporated.

A particularly interesting example is in the centrifugal casting of trench-mortar bombs, though, of course, this practice is limited in its scope, as it calls for special plant. A firm, arising out of their experience in the manufacture of centrifugal cast pipe using Derbyshire iron, conceived the view that the adoption of the centrifugal casting process for the production of bombs would enable such castings to be produced in phosphoric iron to meet the requirements as to freedom from porosity. A centrifugal casting process has been developed specially for the production of these castings.

The mold, incidentally, itself made from 66 per cent Derbyshire pig and 33 per cent returned scrap, is arranged to rotate about its vertical axis, and corresponds to the external shape of the bomb casting. It is split along a horizontal plane corresponding to the point of maximum external diameter of the bomb, and so arranged that the bomb is cast with the open end down and the solid

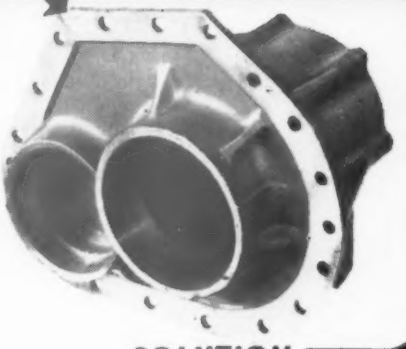

Castolin Eutectic®

EUTECTIC

(Means Lowest Binding Alloy)

LOW TEMPERATURE WELDING

SALVAGING DEFECTIVE ALREADY-MACHINED CASTINGS WITH MACHINABLE EUTECTIC "COLDARC" ALLOY NO. 24



PROBLEM

Salvaging already-machined cast-iron, malleable iron or chrome-nickel alloy steel castings having porous spots or machining errors. . . . When ordinary electrodes were used a hardened fusion line generally resulted. Naturally, this caused great difficulty and time-waste in machining the welded sections.

SOLUTION

Eutectic "Coldarc" Alloy No. 24 (AC-DC). This new kind of electrode can be applied at low heat—without preheating—without deep fusion of the parent metal. Eutectic "Coldarc" Alloy No. 24 gives perfectly *color matching, easily machinable* welds on all ferrous metals. It has been saving hundreds of thousands of dollars in foundries, tool shops, ordnance plants, etc.

Only "Eutectic* Alloys" are the true Low Temperature Welding Alloys that are revolutionizing production welding, maintenance welding and salvaging in war plants throughout the nation. There are 42 specialized rods for every metal and every welding job. Developed and manufactured only by Eutectic Welding Alloys Company.

* Reg. U. S Pat. Off.

FREE LATEST 36 PAGE WELDING DATA BOOK-FN

Contains the answers to hundreds of wartime welding problems: Production Hints • Salvaging Defective Castings • Maintenance Welding • Tool Salvaging. Write Today!

EUTECTIC WELDING ALLOYS COMPANY

SOLE MANUFACTURER - CASTOLIN EUTECTIC WELDING ALLOYS

40 WORTH STREET, NEW YORK, 13, N.Y.

end up. An oil-sand core is used. The mixture of iron used for the bombs consists of Derbyshire pig iron, returned scrap and scrap from the vertical cast-pipe foundry or the spun-pipe foundry in the same plant. The approximate chemical composition of the finished bombs is as follows: 2 to 2.1 per cent silicon; 1 to 1.3 per cent phosphorus; and 0.4 to 0.45 per cent manganese.

The percentage of rejects due to porosity is negligible, and would not amount to a fraction of 1 per cent. The bombs are tested to 1,000-pound hydraulic pressure at the works in the "as-cast" state, and to 100-pound air pressure submerged in water after machining.

The importance of casting temperature control is recognized by all foundrymen. The following describes a modern method of determining casting temperature.

The Schoneld pyrometer is used in steelworks to measure the temperature of steel in open hearth and other furnaces, and in ladles. It is easily modified for cast-iron foundry use and, for practical purposes, consists of a 4-foot platinum / platinum - rhodium thermocouple (diameter of wires 0.5-millimeter), flex, leads and a portable indicator. This gives temperature readings accurate to 2 or 3 degrees Cent. in 10 seconds, which is adequate for all normal foundry purposes. The Cambridge Instrument Co. Ltd., makes a workshop potentiometer for steel-melting temperatures which can be calibrated over the cast-iron range, and gives an accuracy of 1 degree Cent., in 2 to 3 seconds.

A sheath lasts up to 20 times with care, but the initial rate of breakage is higher until people get used to handling the pyrometer with reasonable care. In the space of a month this instrument passed through the stages from a new and delicate untried research tool to a normal foundry control instrument used by charge-hands and foremen with confidence. Maintenance may be carried out by a junior laboratory assistant. The feature which appeals strongly is that temperatures can be determined accurately and quickly through blacking or slag. If the couple is broken or damaged by metal, the instrument will either not register or give such impossibly high results that the fact of its having broken is obvious.

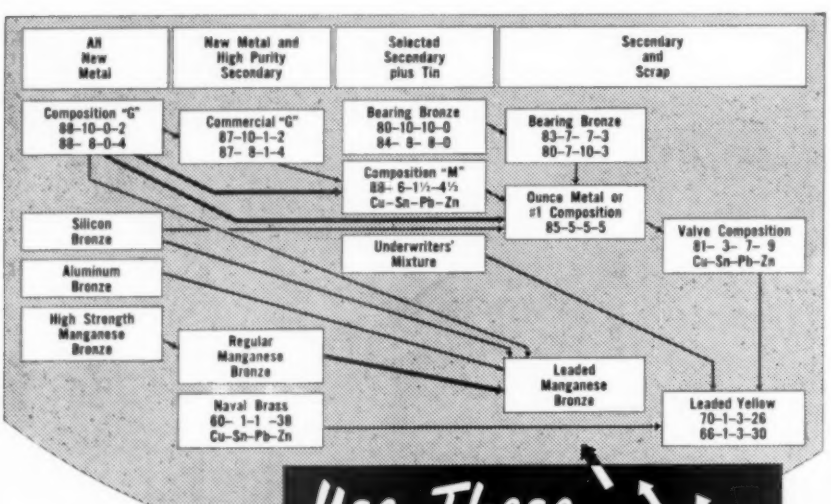
The use of the instrument interests molders, and they vie with each other in the use of the instrument and begin to take an intelligent interest in the casting temperatures. The results of accurate casting temperature control in insuring soundness are most marked. Troubles due to mis-running, sinking and porosity can be minimized and greater confidence felt in founding higher phosphoric mixtures if the casting temperature is controlled accurately. Wasters, in certain castings which have to stand a porosity test, have been reduced from 20 to 5 per cent by casting temperature control. Porosity was at the ingates.

### Use High Phosphorus Iron

In machine tool practice a phosphorus content of about 0.8 per cent is regarded as satisfactory, although this figure is higher than prewar practice. Strength to meet British Standard Specifications 786, Grades 1 (35,800 pounds per square inch) and 2, (38,000 pounds per square inch) can be obtained with this phosphorus figure. Other makers have found it possible to use considerably higher phosphorus, one successfully working with mixtures of Derbyshire irons and scrap, combined with extensive use of denseners and hot pouring. The use of denseners has had to be greatly extended to compensate for the higher phosphorus now used.

However, in certain cases, phosphorus lower than 0.8 per cent is necessary, particularly where heavy t-slotting is involved, when figures as low as 0.3 per cent may be necessary in extreme cases; 0.6 per cent phosphorus, combined with a fairly low total carbon, is regarded as the high limit for flame hardened lathe beds.

During the past 12 years a special densening technique has been developed by one machine tool maker for a wide range of medium and heavy castings, and using a wide range of metal compositions. However, the technique is extremely involved and caution is advised in the use of denseners by those who may be inexperienced; one does not turn to denseners if reasonable results can



All New Metal
New Metal and High Purity Secondary
Selected Secondary plus Tin
Secondary and Scrap
Composition "G" 88–10–0–2 88– 8–0–4
Commercial "G" 87–10–1–2 87– 8–1–4
Bearing Bronze 80–10–10–0 84– 8– 8–0
Bearing Bronze 83–7– 7–3 80–7–10–3
Composition "M" 88– 6–1½–4½ Cu–Sn–Pb–Zn
Ounce Metal or #1 Composition 85–5–5–5
Valve Composition 81– 3– 7– 9 Cu–Sn–Pb–Zn
Silicon Bronze
Aluminum Bronze
Underwriters' Mixture
High Strength Manganese Bronze
Regular Manganese Bronze
Leaded Manganese Bronze
Naval Brass 60– 1–1 –38 Cu–Sn–Pb–Zn
Leaded Yellow 70–1–3–26 66–1–3–30

Use These
ALTERNATIVES
Wherever You Can

Send for booklet
"INGOT METALS OF TODAY"

•

16 STANDARD INGOT METALS BY AJAX

Ajax Tombasil
Ajax Plastic Bronze
Ajax Anti-Acid Bronze
Ajax Phosphor Bronze
Ajax Red Brass Ingots
Ajax Manganese Bronze
Ajax High-Tensile Manganese Bronze
Ajax Golden Glow Yellow Brass
Ajax-Hamilton Gear Bronze
Ajax Nickel-Copper 50-50%
Ajax Manganese Copper
Ajax Aluminum Alloys
Ajax Phosphor Copper
Ajax Silicon Copper
Ajax Nickel Alloys
Ajax Phosphor Tin

NOTE

* Proper Melting Decreases Foundry Losses," contains interesting data. Also, the booklet, "Nonferrous Ingot Metals of Today." Write for both of these. They are free.

Notice how the arrows on the W.P.B. chart point to the *right*. . . . They show how alternative materials *currently available* can be utilized by foundrymen as now permitted by many designers. The purpose is to conserve primary metal at the mine through increased use of secondary ingots. Sometimes great ingenuity is called for, yet remember this:

The first program for scientific control of ingot metal was set up by Ajax 45 years ago. The result has been metal and practical technical follow-through in which Ajax increases your production by reducing rejects.

THE AJAX METAL COMPANY
ESTABLISHED 1880 PHILADELPHIA

ASSOCIATE COMPANIES:
AJAX ELECTRIC FURNACE CORP. Ajax-Wyatt Induction Furnaces for Melting
AJAX ELECTROTHERMIC CORP. Ajax-Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC. The Ajax-Hultgren Electric Salt Bath Furnace
AJAX ENGINEERING CORP. Ajax-Tama-Wyatt Aluminum Melting Induction Furnaces

be obtained from the metal along with correct foundry technique.

There are many aspects to consider, such as: (1) Quality of metal to be densened; (2) ratio of section of densener to section of casting to be densened; (3) design of densener in respect to design of the particular areas to be densened; and (4) composition of the material composing the densener.

Each class of casting can only be dealt with when all conditions are known. Under such restrictions no more than some generalizations can be given:

(a) Denseners may be made of a variety of materials (as well as section and volume) such as steel, cast iron, silicon-carbide, refractory bricks of various conductivities, etc.

(b) In light castings, disturbances on the surface of the densener are mostly due to moisture, rust or excessive application of oil coatings applied to the densener.

(c) In medium and heavy castings, defects occur from overheating and a sharp rise in the temperature of the densener before the metal of the casting has solidified, rather than from moisture on the surface of the densener.

(d) With green-sand light castings, the surface of the densener should be protected by applying a trace of machine oil to the surface exposed to the molten metal and the slightly oil-wetted surface rubbed over with plumbago blacking.

(e) Densener applied to dried sand molds should be coated with a refractory wash and dried along with the mold.

**Rust Causes Blow Holes**

(f) Whether used in green or dry sand molds, the densener, of course, should be free from corrosion. If rust is present on a densener used in a green-sand light casting mold, a blown casting may result, and if a densener has a rusty surface and it is put into a dried sand mold and a refractory applied to the corroded surface, the gas evolution from the rust will blow off the refractory coating and expose the densener to a burning-on action by the molten metal, resulting in blowholes, often very large ones.

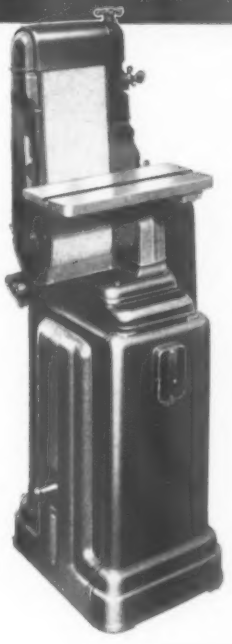
From the foregoing, it will be seen that the densener must be used clean and all effort made to prevent an overheating of the metal of a densener, whenever it is made of metal. Therefore, it is important that metal densener should be located in as remote a position as is possible in respect to the entry of the metal. The least that one must do is to avoid the direct impingement of the metal entering the mold, on to the metal densener.

Detailed consideration of inoculation technique and the highly satisfactory results obtained by its adoption are outside the scope of the present report. In view of the urgent necessity for meeting specifications with a lower grade of raw materials than would normally be used, however, the subcommittee urges all ironfounders to adopt this technique wherever possible and desirable, in order to obtain the best results from the available materials.

The final silicon content of cast iron poured into molds must be controlled within reasonable limits to give a suitable relationship between carbon and silicon contents and the rate of cooling which is determined by the sectional thickness of the castings. Late silicon additions, made to the metal at the furnace spout must also conform to the above general principle, but the final silicon content usually can be somewhat higher than normal, other things being equal, with beneficial results.

Summarizing what already has been published, the Sub-committee recommends that between 0.5 and 1.0 per cent silicon should form the late addition, irrespective of the amount of silicon in the metal as charged to the furnace. While early practice favored the introduction of ferrosilicon in powder form, granular form of pea size or even larger is now preferred. This preference, however, may depend to a certain extent on the silicon content of the ferrosilicon readily available. It is usually considered that the powder form is quite effective when high silicon ferrosilicon is being used, as the bulk to be added is not very great. With ferrosilicons of lower silicon content, however, it is better to use pea size material.


Substantial savings in time and money . . . with these DELTA Abrasive Finishing Machines



DELTA
Abrasive Belt Machine
for Metal Polishing

Widely used for polishing and sizing metal parts. Heavy and husky for steady production — yet easily moved just where you want it. Gives you real savings in first cost, power cost, over-all cost of operation — compared with larger machines. Used horizontally or vertically. Double sealed ball bearings, lubricated for life. Completely enclosed and guarded for maximum safety. Install one or a battery in your plant — for results that reflect credit on your choice.

DELTA
Abrasive Disk Machine
for the Pattern Shop

Completely machined, true-running disk. Husky spindle, carried on self-sealed ball bearings. Designed for long life, savings on power, dependable results. Use of "Distic" for applying abrasive disks eliminates messy gluing, removal of the disk from the machine, overnight drying — change disks every few minutes, if you like.

DELTA MILWAUKEE Machine Tools

See these efficient, money-saving machines at your Delta industrial distributor's — check priorities and deliveries.

*Write today for the Delta catalog.*

WF-2

THE DELTA MANUFACTURING CO.
622K E. Vienna Ave., Milwaukee 1, Wis.

Please send me your new catalog giving full details on the Delta Abrasive Finishing Machines and your full line of low-cost machine tools.

Name_____
Company_____
Address_____
City_____ State_____

Inoculation should take place as late as possible, since its beneficial effect disappears after an interval of 15 to 20 minutes. Where fairly large quantities of metal are being treated, silicon treatments should be arranged so that the late addition is made near the end of the last tap, so that not more than, say, 10 minutes' time elapses between the completion of the silicon treatment and the pouring of the last mold from that particular batch of metal.

Generally, the inoculant will mix satisfactorily with the molten metal stream without the introduction of any special device. If, however, there is reason to doubt the effectiveness of the inoculation, "step" bricks or similar baffles can be built into the furnace spout, to provide some degree of turbulence which assists in the absorption of the ferrosilicon. For further particulars reference should be made to the papers given in the list of references in Appendix 2.

Following the control of nickel and the curtailment of high-grade raw materials, one member has adopted the following wartime mixture of metal for light diesel cylinder head and general castings down to ¼-inch thick to meet British Standard 786, Grade 2 (tensile strength 38,000 pounds per square inch). It will be noted that a late silicon addition is used: 55 per cent refined pig (total carbon 3.1 per cent, silicon 1.7 per cent); 15 per cent steel scrap; 26 per cent returns from same mix, and 4 per cent ferrosilicon, ferrochrome and ferromanganese.

Granulated 45 per cent ferrosilicon is added at the spout to raise silicon 0.4 per cent to yield the following average analysis: total carbon 3.2 per cent; silicon 2.1 per cent; manganese 1.2 per cent; phosphorus 0.25 per cent; and chromium 0.28 per cent. This metal is regularly giving 20 to 21 tons (44,800 to 47,000 pounds) per square inch on the 0.875-inch diameter bar.

Although this mixture was designed primarily to produce high strength, and raw materials were chosen from available foundry stock, not specially purchased at the time of the first trial casts, it showed that good tensile figures could be obtained with high-carbon cast iron, as carbon percentages up to 3.4, and even as high as 3.5 per cent, have been obtained without any noticeable effect on tensile strength.

Tensile strengths of about 20 tons (44,800 pounds) per square inch are obtained with silicon at 2.0 to 2.2 per cent. Although it was found that by increasing the steel in the charge by 10 per cent, and decreasing the silicon to 2.0 per cent, a very slight increase in tensile strength on the 0.875-inch diameter bar resulted, the lower silicon content was not found suitable for the cylinder work for which the metal was designed. These results are largely due to the low phosphorus content of about 0.25 per cent and to inoculation at the spout.

### Materials Are Restricted

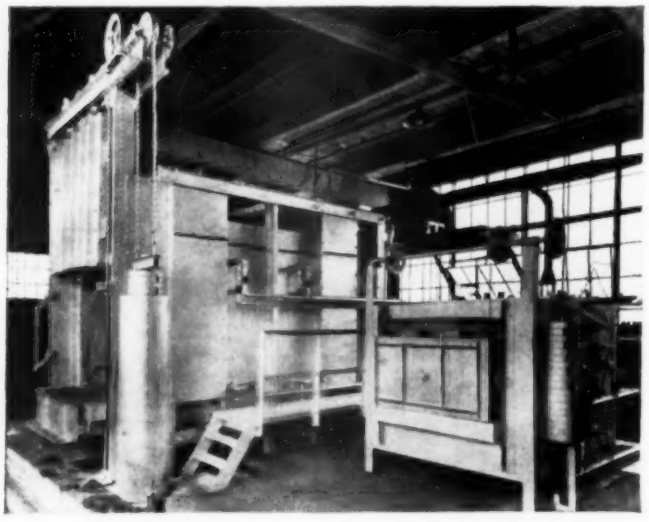
It is very difficult to make suggestions as to methods to be adopted if supplies of low-carbon and/or low-phosphorus materials become restricted further, particularly as the extent to which this has been carried to date varies so much in individual foundries. Therefore, some of the suggestions offered later may have been widely adopted already, and should have been if not. Moreover, some of the possibilities, such as partial bessemerizing, are impracticable, owing to the difficulty in obtaining the necessary plant, while labor supply difficulties may also prevent or limit the adoption of other suggestions.

Special attention should be given to the suggestions listed previously in relation to meeting restrictions in low phosphorus materials. Other recommendations are:

(1) Careful scrutiny of specifications by buyers to insure that a higher quality of iron is not demanded than is absolutely necessary.

(2) Study of gating and feeding methods, particularly the latter, to insure adequate supply of liquid metal to prevent porosity in heavy sections, and combined with this, the use of denseners and attention to molding sand conditions. In short, the establishment of a high standard of foundry technique.

(3) Maximum use of furnaces, such as electric and rotary, and the extended use of these furnaces for duplexing. In

These **VULCAN FURNACES**

**Assure Fast, Efficient, Flexible Production!**

VULCAN Car Hearth and Box Type Furnaces for annealing, normalizing, hardening and drawing. Car Hearth unit has capacity of 20 tons, while Box Furnace is used for smaller charges on rush orders. Both produce close temperature uniformity over a range from 650°F. to 2000°F., with good surface conditions on the work.

VULCAN Furnaces of the types illustrated may be oil or gas fired, with automatic temperature program control, furnace pressure control, and motorized car and door-lift mechanism.

**We can supply, on short notice, melting and heat treating furnaces for aluminum and manganese castings and forgings. Write regarding your requirements.**

**VULCAN CORPORATION**

**1797 CHERRY STREET, PHILADELPHIA, PA.**

these furnaces there is no carbon pick-up and nearly always a reduction in carbon content, and generally much higher test results are obtained.

(4) Manufacture of own refined pig iron from local steel scrap which is of such a type as to be unsuitable for direct use in mixtures. This should be restricted to extreme cases, owing to fuel consumption involved. Where briquetting plants are available, these should be used to the utmost, and low-phosphorus borings segregated for briquetting.

(5) Close cupola control, including insuring that cupola is working under "optimum" conditions (incidentally effecting fuel economy thereby).

(6) Segregation of different qualities of foundry scrap for remelting and avoidance of contamination of low-phosphorus mixtures by either high-phosphorus foundry scrap or high-phosphorus cupola charges following closely on low-phosphorus charges in the furnace. In certain foundries it might be possible to run high-phosphorus and low-phosphorus irons on alternate days.

(7) A reversion to the older method of getting good castings by concentration on silicon control, running varied silicons to suit different thicknesses of castings, as distinct from the more modern way of using a low-phosphorus, and possibly low-carbon, iron which will suit a wide variety of sectional thicknesses.

(8) The use of late silicon additions as discussed previously.

## APPENDIX 1

*Selected Bibliography on Phosphorus in Cast Iron*


Hurst, J. E.—"The Influence of Phosphorus on Cast Iron." *Foundry Trade Journal*, 1924, XXX, 433-436.

MacKenzie, J. T.—"The Influence of Phosphorus on Cast Iron." *Transactions* A.F.A., 1926, XXXIV, 986-1007.

Bolton, J. W.—"Phosphorus Affects Qualities of Grey Cast Iron." THE FOUNDRY, 1926, LIV, 378-382; 423-425.

Everest, A. B., and Hanson, D.—"The Influence of Nickel on Iron-Carbon-Silicon Alloys containing Phosphorus." *Journal* Iron and Steel Inst. 1928 (1), 339-361.

Keil, O. von, and Mitsche, R.—"The Effect of Phosphorus on the Formation of Graphite." *Stahl und Eisen*, 1929, XLIX, 1041-1043.

Kunkele, M.—"Constitution and Formation of the Phosphide Eutectic in Cast Iron." *Mitteilungen*, K. W. Inst. Eisenforschung, 1930, XII 23-31; *Stahl und Eisen*, 1930, L, 1207-1208.

Piwowarsky, E.—"The Influence of the Elements Silicon, Phosphorus, Aluminum, Nickel and Chromium on Quasi-Isotropy and the Wall-Thickness Sensitivity of Cast Iron." *Die Giesserei*, 1931, XVIII, 533-537; *Foundry Trade Journal*, 1932, XLVI, 147; 152.

Dessent, J., and Kagan, M.—"Contribution to the Study of the Influence of Phosphorus on Iron." *Transactions* A.F.A., 1931, XXXIX, 923-952.

Mitsche, R.—"The Phosphide Eutectic in Cast Iron." *Die Giesserei*, 1932, XIX, 497-499.

West, W.—"Phosphorus in Cast Iron." *Proceedings* I.B.F., 1932-33, XXVI, 392-417.

Bolton, J. W.—"Phosphorus in Cast Iron." THE FOUNDRY, 1933, LXI, August 16-18; 48; September 16-18, 52; 54.

Sohnchen, E., and Piwowarsky, E.—"Influence of Chemical Composition of Cast Iron Upon Wear." *Archiv. f.d. Eisenhuttenwesen*, 1933, VII, 371-372.

Dessent, J., and Kagan, M.—"The Role of Phosphorus in Cast Iron." *Bulletin* Association Technique de Fonderie, 1933, VII, 7; 61-64. (See also 1931 paper to A.F.A.)

Berger, R.—"The Influence of Phosphorus on the Castability of Iron-Carbon Alloys." *Fonderie Belge*, 1933, II, 14-21.

Hurst, J. E.—"Influence of Phosphorus on the Properties of Hardened and Tempered Cast Iron." *Journal* Iron and Steel Inst., 1933 (1), 229-251.

West, W.—"Some Factors Affecting Strength and Solidity in Cast Iron." *Bulletin* Association Technique Fonderie, 1933, VII, 514-527; see also *Foundry Trade Journal*, 1933, XLVIII, 90; 103-105; 114.

"A Report of the Work of the Cast Iron Sub-Committee of the Technical Committee." *Proceedings* I.B.F., 1933-34, XXVII, 76-107.

Piwowarsky, E.—"Certainty of Results as the Basis for the Manufacture of High Test Grey Iron." *Transactions* A.F.A., 1934, XLII, 705-736.

Paschke, M., and Bischof, F.—"Influence of Phosphorus on the Mechanical Properties of Gray Cast Iron at High Temperatures." *Die Giesserei*, 1935, XXII, 447-452.

Hugo, E., Piwowarsky, E., and Nipper, H.—"Influence of the Essential and Alloying Elements Silicon, Phosphorus, Nickel, Chromium, Molybdenum, Tungsten and Copper on the Section Susceptibility of Gray Cast Iron." *Die Giesserei*, 1935, XXII, 421-428; 452-458.

"First Report of the Research Committee on High Duty Cast Irons for General Engineering Purposes." *Proceedings* Inst. Mech. Eng., 1939, CXL, 173, et. seq.

Thum, A., and Petri, O.—"Influence of Phosphorus on the Properties of Pearlitic Cast Iron." *Archiv. f.d. Eisenhuttenwesen*, 1939, XIII, 149-153.

McRae Smith, A. E.—"Melting and Casting Problems in the Production of High Strength and Special Duty Alloy Iron Castings." *Proceedings* I.B.F., 1940-41, XXXIV, 73-100.

"Reports of Special-Duty Cast Irons." Second Report. Phosphoric High-Duty Irons. *Proceedings* Inst. Mech. Eng., 1941, CXLVI, 61-66; see also:

Pearce, J. G.—"The Manufacture, Specifi-

Milwaukee Chills have passed the rigid inspection of foundrymen who demand the best. These Chills have been improved to accelerate cooling, insuring sound castings free from internal shrinks and surface checks. They will also prevent molten metal from cutting into the sand. These Chills will cut scrap losses, and reduce welding and cleaning costs.

Ask for samples and prices on Milwaukee Thread Stem Chaplets . . . . Standard Radius Chills . . . . Schmitz Chaplets . . . . Patented Adjustable Radius Chills . . . . Other Chaplets and Foundry Supplies.

Milwaukee
CHAPLET AND MFG. COMPANY
MILWAUKEE • WISCONSIN

cation and Use of Phosphoric High-Duty Irons." *Foundry Trade Journal*, 1942, LXVI, 193-194; 209. This paper is based mainly on the above report, which was reprinted in *Foundry Trade Journal*, 1941, LXV, 105-107.

**APPENDIX 2**

*Selected Bibliography on Late Additions of Silicon to Cast Iron*

Crosby, V. A., and Herzig, A. J.—"Late Additions of Silicon to Cast Iron." THE FOUNDRY, 1938, LXVI, January, pp. 28-29 and 73.

Comstock, G. R., and Starkweather, E. R.—"Comparative Effects of Late Additions of Titanium and Silicon to Grey Cast Iron." *Transactions* A.F.A., 1938, XLVI, pp. 353-369.

Schnee, V. H., and Barlow, T. E.—"Copper, Aluminum, Silicon Alloys for Addition to Cast Iron." *Transactions* A.F.A., 1940, XLVII, pp. 725-739 (see p. 726 for reference to earlier work).

Fiwowarsky, E.—"Influence of Ladle Additions on the Properties of Cast Iron." *Die Giesserei*, 1940, XXVII, pp. 21-30; 47-52; bibl. 42 refs.; and ibid., pp. 124-125. Abridged translation in *Foundry Trade Journal*, 1940, LXII, pp. 325-327.

Eash, J. T.—"Effects of Ladle Inoculation on the Solidification of Grey Cast Iron." *Transactions* A.F.A., 1942, XLIX, 887-906.

Braidwood, W. W.—"Cupola-Melted High-Duty Cast Irons." Practical Experience of a New Departure in Cupola Practice in Making High Strength Irons. *Foundry Trade Journal*, 1942, LXVII, pp. 67-71; 89-94; 117-120; 123.

---

Worthington Pump & Machinery Corp., Harrison, N. J., has acquired the Ransome Machinery Co., Dunellen, N. J. The company produces concrete mixers, road paving equipment, welding positioners and turning rolls.

Name on Request

IN March, 1938, he installed 354' x 30" x 6-ply SAHARA on a hot sand-conveyor on which during the preceding ten year period three competitive belts were used. After deducting a 3-year shutdown period during the big depression, these belts gave a total of 7 years service—an average of $2\frac{1}{3}$ years. The Sahara belt after five years—including 18 months maximum wartime production—is still operating at peak efficiency.

IMPERIAL BELTING COMPANY
1750 S. Kilbourn, Chicago 23, Ill.

★

REXALL & SAHARA FOUNDRY BELTING

# POURS TRIPLEX STEEL ON CONVEYOR

(*Continued from page* 95)

point the blast is shut off, the converter tipped electrically and the charge poured again into an 8-ton transfer ladle. This is moved to a slagging station where the heat is skimmed. The slag, being mixed with a stream of water, descends in a chute to the first floor where it is picked up after quenching by a bucket conveyor and deposited into hoppers over a rail siding, outside the building. Cupola slag is handled similarly, a chute extending from the slag hole in the cupola down to the base of the bucket conveyor on the second floor. Cupola and converter slag thus is handled with a minimum of difficulty and is broken up by the sudden quenching into suitable form for use as ballast, road material, etc.

Converters are supplied with blast air at 5 pounds pressure by centrifugal blowers rated at 10,000 cubic feet per minute. The converters blow into a sheet steel stack equipped with slanting water-cooled baffles, to trap oxides from the blow. A hopper at the base of the stack collects this fine material. Analysis of blown metal averages 0.06-0.10 per cent carbon 0.05-0.10 per cent manganese, 0.03-0.08 per cent silicon and 0.03-0.05 per cent sulphur and phosphorus.

### Poured Into Furnace

After skimming, the ladle filled with bessemer steel is carried by crane to the electric furnace and the molten metal is poured into the furnace through a charging spout or lip on one side of the furnace, on the opposite side from the tapping spout, as shown in Fig. 1. A bath of about 10 tons of steel is kept in the electric furnace continually, building up to around 15 tons after bessemer metal is charged and then receding to 10 tons as steel is tapped out for pouring the molds.

Alloying is usually done in the ladle before transfer to the electric furnaces, the latter being essentially holding furnaces. Analysis of the steel produced for casting requiring high physical properties is 0.30-0.35 per cent carbon, 1.10-1.30 per cent manganese, 0.15-0.40 per cent silicon, 0.40-0.50 per cent chromium, and 0.05 per cent maximum sulphur and phosphorus.

Since both bessemer and electric furnaces are acid lined, there is no opportunity to remove phosphorus, which must be held to the low point of 0.05 per cent. This calls for attention to scrap material charged in the cupolas, as well as to the pig iron in the cupola charge, so that phosphorus will not exceed the maximum specification. A Ford developed basic cupola is now on part production and this unit will eliminate the necessity of selecting low phos-

phorus raw materials as this unit is successfully removing phosphorus.

Steel is tapped from electrics at about 3000 degrees Fahr., and loses about 80-100 degrees of temperature before being poured into molds. Careful temperature control at this point in the process is essential because of the character of the steel. To insure against excessive temperature loss, molds are mounted on cars on a continuously moving conveyor line which routes the molds past a pouring platform immediately in front of the electric furnaces.

The first mold line, for example, carries 112 molds on the track which travels across the width of the pouring floor four times, looping back twice at each extremity. The outside loop at the furnace side fans out of travel the length of the pouring station, and also at the opposite side where the molds are shaken out. After the molds are removed from the moving platforms on the track, they are replaced by new molds prepared on a battery of jolt machines spotted alongside the conveyor line.

### Castings are Cooled

The next two conveyor lines are similar except that they are arranged to carry larger molds and are served by four turntables on which are mounted sand-slingers for making up the molds.

After castings are shaken out, they are hung on a cooling conveyor which is routed upward to the fourth floor level where heads are broken off or burned off and then back down to the second floor level for heat treatment. The conveyor is of such length that it takes about 5½ hours for a casting to move from shakeout to the trimming stations on the fourth floor.

Large 60-foot normalizing furnaces are provided to heat parts on trays carried through the furnace on a conveyor in three adjacent lines on about a 7-hour cycle. Next to this unit is an even longer double-deck quench and drawfurnace for steel castings, parts traveling through the high-heat zone at the lower level, then are quenched automatically and transferred to the upper level for drawing.

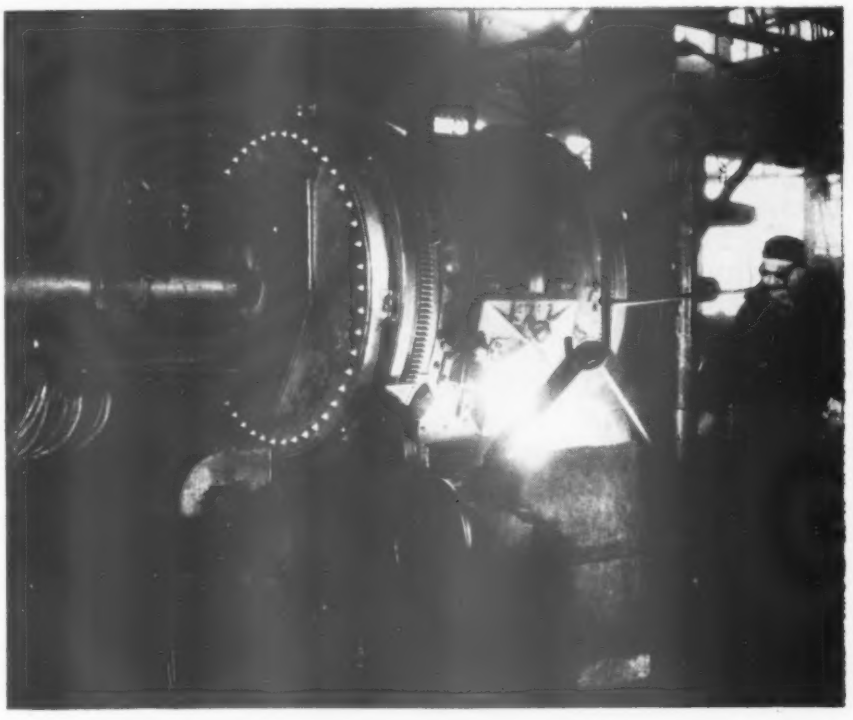
Close by these units is a battery of batch-type homogenizing furnaces, 12 x 12 feet in size, for treating armor castings. These furnaces are served by two traveling floor cranes operating along a track in front of the furnaces. Castings are loaded onto furnace rails by a charging arm which comprises a series of rails which fit between the furnace rails and thus deposit the charge on the latter. Removal is by similar procedure, and the arm carries the heated batch of castings out of the furnace and immediately into a water quench tank which is a part of the entire crane mechanism. Additional batteries of these furnaces are operated on the first floor of the foundry, for quench and draw operations.

Extensive conveyorization of sand handling and reclaiming is another noteworthy achievement in the new steel foundry. Sand is received in cars and dropped through floor gratings into bins, from which elevator conveyors move it up through dryers and mixers and on to molding machines. Two large multiple rotary hearth roasters have been installed to reclaim used sand, and it is expected that new sand will have to be added to the system in only minor amounts once the equipment is in full operation.

Coremaking operations are all at first floor level, approximately under the pouring lines on the second floor. Standard types of coremaking and coreblowing equipment are operated, together with a battery of vertical corebaking ovens.

## Domestic Mining of Corundum Starts

Domestic production of corundum has started for the first time since the last war, thereby saving cargo space in shipments from Africa. Supplies available in the new operation are estimated as high as one quarter of total current consumption. Domestic mining is being undertaken at a recently reopened deposit in South Carolina by Withers Inc. Quality is said to approximate the best African grades. Old deposits in Georgia also are being considered as an additional source of supply.

**Detroit Furnaces**

**BOOST PRODUCTION WITH LESS LABOR**

Another well-known characteristic of a Detroit Rocking Electric Furnace is its high rate of production per man-hour. With a Detroit Electric you can produce as many as eight ferrous heats or sixteen non-ferrous heats in one eight-hour shift. And you pour these heats with a minimum of dirt, fumes and hard work. Because of their clean operation, ease of control and automatic features, Detroit Furnaces give you precise metallurgical results. They can produce in quantity (up to 4 tons per heat) any desired analysis.

For cleanliness and ease of operation, for precise metallurgical results—and for lower scrap losses, better all-around castings and greater production speed, it will pay you to operate Detroit Rocking Electric Furnaces.

**Detroit**

**ELECTRIC FURNACES**

DETROIT ELECTRIC FURNACE DIV., KUHLMAN ELECTRIC CO., BAY CITY, MICH.

# MOLDING LARGE BRONZE PROPELLERS

(*Continued from page* 93)

with slot cores removed were set up true and level about 50 feet apart, center to center, on the floor of the main bay of the foundry. Four drags were bolted in proper position on each plate and a continuous program arranged for the production of two castings each day on Monday, Tuesday, Wednesday and Saturday, and none on Thursday or Friday. This does not mean that an individual mold is completed and cast and shaken out in a day. Elapsed time from shakeout to shakeout on each mold is 4 days. With six molds in successive stages of progress the remarkable record is achieved of producing eight castings per week.

Three molders and three helpers start making the mold at 6:30 in the morning and finish ramming all the sand at 3:30 in the afternoon. The mold is not disturbed until the following morning, when the copes are lifted off and the pattern is removed. The mold surfaces are dressed and blacked and then the copes are replaced on the drags and the mold is allowed to air dry until night. A portable gas burner and fan are mounted over the open hub and hot air is driven into the mold for 12 hours. The following morning the center core is set, runner basin and riser are replaced in position and the casting poured. The casting is not touched until the following morning when the riser casing and sand are removed to expose the shrink head. On the following morning the copes are removed, the casting is lifted out and the drags are made ready for a repetition of the cycle.

The foregoing is merely a brief summary, sufficient for the casual reader, or for one not particularly interested in foundry practice. Foundrymen who have made propellers, who expect to make propellers, or merely foundrymen of the student type who lose no opportunity of increasing their knowledge of the foundry in its multitudinous ramifications will appreciate further and more detailed reference to the many interesting features and ingenious shop kinks adopted or developed to facilitate production of these large bronze castings.

### Rigid Mold Is Essential

Since these castings have to conform to exceedingly close limits in size, shape, metal thickness and total weight, a rigid mold is absolutely essential. A rigid mold implies substantial rigging and sand that is dried or baked. The rigging in this case includes heavy cast iron flasks, bolted solidly to a bottom plate, and copes bolted to the drags in a manner to resist any and all strains developed in the mold when it is filled with metal. Even at the tips of the blades approximately 6 feet 6 inches below the top of the sink head, the castings show no fins. All castings are uniform in weight.

Instead of the usual dry sand or brick and loam, the molding material is a silica sand bonded with cement and prepared in a muller type mixer. The mixture contains one part cement to eight parts sand, wet down to a moisture content of 6 per cent. The mixture is as readily workable as ordinary molding sand. The entire flask is not filled with this material. The amount is limited to a thickness under and over the pattern, and for the final ramming in the cope. The greater part of the copes and drags is filled with broken rubble from previous molds, with exceptionally high permeability for the escape of the negligible volume of steam generated during the mold drying process, or an equally negligible amount of gas generated in the inert material in contact with the molten metal. Extended reference to the use of cement bonded sand as a molding material according to the so-called Randupson process was presented in the December, 1935, the January, February, and March, 1936 and the November 1937 issues of THE FOUNDRY.

In addition to providing a hard and dry mold face, the cement bonded sand reduces molding time by eliminating the


# WAR *Puts a Premium on* KNOWING HOW

★ Thorough familiarity with the contents of the following books will place you in the "know how" class . . . prepare yourself now for tomorrow's demands . . . broaden your knowledge of the foundry industry.

**ELEMENTARY FOUNDRY TECHNOLOGY,** (New Third Edition), by L. A. Hartley, revised and brought up-to-date by Edwin Bremer and Pat Dwyer. The accepted standard text on the basic principles of foundry practice. This new edition includes a revised chapter on pig iron to make it conversant with present day practices, as well as a new chapter on malleable cast iron foundry practice. Other subjects covered are: Effects of Elements of Iron; Iron Manufacture; The Cupola and its Operation; Elementary Problems in Steel Foundry Production; Brass Melting; Foundry Sands; Gates and Risers; Molding Machines; Core Machines; and Long Life Molds. Includes glossary and bibliography. $3 postpaid.

**GATES AND RISERS FOR CASTINGS,** (New Second Edition), by Pat Dwyer, engineering editor of THE FOUNDRY. A complete encyclopedia and practical guide to everyday foundry problems. Answers questions for experienced and apprentice foundrymen on "how to eliminate casting defects". More than 300 different subheadings in the book's 27 chapters cover gray iron, steel, malleable iron, aluminum, brass and bronze casting. Profusely illustrated with helpful drawings and illustrations of the "how-to-do-it" type. Completely cross-indexed. $4 postpaid.

**FOUNDRYMEN'S HANDBOOK,** (Second Edition). Long a recognized standard handbook on foundry practice. Originally $6, this book has been reduced to $3 because a few specifications are now out of date. However, basic information of cost analysis, and information on formulas, tables, weights and general foundry practice is of value to workmen, foremen, superintendents, managers and owners. Pattern-makers, metallurgists and executives find its contents helpful in meeting everyday foundry problems.

**MODERN BLAST CLEANING AND VENTILATION,** by C. A. Reams, engineer of Ford Motor Co. Describes latest and most approved methods of casting cleaning in plain language. Full of completely practical suggestions on approved methods and practices. Full information on abrasive selection and use is included. A practical book for practical foundrymen. $4 postpaid.

**IMPACT CLEANING,** by Wm. A. Rosenberger. Covers both theoretical and practical information on impact cleaning with shot and sand. Presents the "how and why" of high cleaning costs and recommends methods for their reduction. Proper methods of ventilation are also covered. $7 postpaid.

**MELTING IRON IN THE CUPOLA,** 240 well illustrated pages covering construction, operation and maintenance of the cupola. Suitable for the apprentice and the experienced foundryman. Tables, formulas and a complete cross-index listing more than 1000 items make this a valuable and practical book. $2 postpaid.

*ORDER YOUR COPIES TODAY*

**THE FOUNDRY**

**PENTON BUILDING** *Book Department* **CLEVELAND, OHIO**

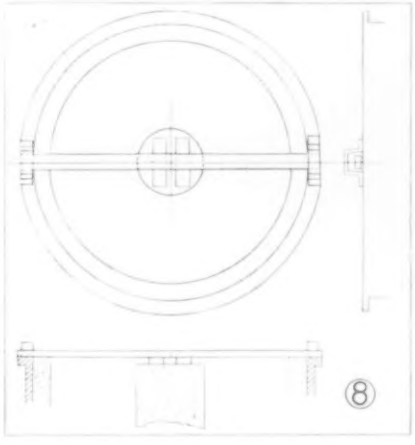
need for practically all gaggers in the cope. Prudence suggests the use of a few in the nose near the hub, and in the pocket at the tip of the blade where the joint line of the pattern dips below the joint line of the flask in that vicinity.

Sand to a thickness of 3 or 4 inches is removed from the face of the mold after the casting has been lifted out. The pattern then is set into place with the hub resting on a cast iron base block extending upward the proper distance from the foundation plate. The pattern thus is automatically centered and leveled and its own weight holds it in place while the sand is rammed under the blades. The problem of ramming the sand under a wide curved blade with the edge in some places only 3 or 4 inches from the flask was solved in an ingenious manner. Sand is shoveled through openings or windows in the high side of the drag flask and packed into place with long wooden rammers. When the space is nearly filled, pieces of flat plates are dropped vertically into place against the inside face of the flask to serve as shutters on the window openings. Sand then is shoveled into the remaining space between pattern and flask and rammed in the usual manner. Surplus sand is scraped away and the molder makes a parting with his trowel all the way around the center of the blade edge.

Method of gating the casting near the bottom of the hub involves a slight change in the foregoing technique as applied to one of the drags. Before sand is rammed under the blade a row of refractory brick tiles 3 inches inside diameter is laid from the side of the hub near the bottom and between two blades to a point near the outer corner of the high side of the drag. In this corner, clear of the blade, a vertical sprue is built up to the joint line in the same manner. Later, of course, the tile sprue is continued through the cope, an extension on the cope and a dry sand runner basin.

This type of gate employed extensively in steel foundry practice and to some extent in gray iron foundries engaged in the production of heavy castings, has proved highly satisfactory in the present instance. The highly refractory tile provides a clean, smooth and perfectly dry passage for a type of metal notorious for its tendency to produce dross under little or no provocation.

*(To be concluded next month)*



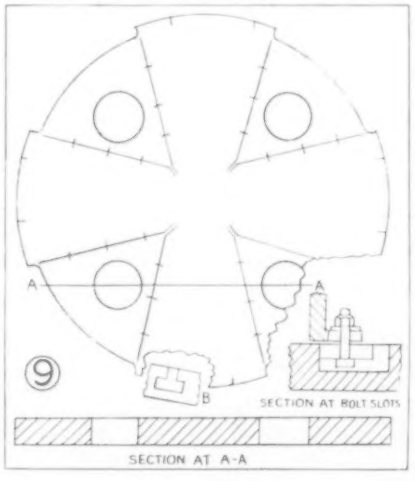




*Fig. 8—Plan and sectional views showing method of anchoring center core in hub*
*Fig. 9—Heavy circular cast iron base plate is provided with slots for bolting the drags*


DAYTON WHEELS for PORTABLE GRINDERS

Many of America's most progressive foundries are meeting today's demands for an ever increasing tonnage through a wider use of portable grinders. Frequently, this calls for "common-sense" changes in their portable grinding wheels—changes which may involve new sizes . . . new shapes . . . different grains . . . different grades.

Dayton Portable Grinding Wheels—especially engineered to meet TODAY'S NEEDS—are bringing smiles to the faces of production men in scores of foundries throughout the land. Why not let one of our "know how" engineers put his experience to work for you!

SIMONDS WORDEN WHITE CO.
710 NEGLEY PLACE
DAYTON • OHIO

DAYTON GRINDING WHEELS

# METALLURGY IN THE CASTINGS INDUSTRY

(*Continued from page* 107)

poor foundry that cannot average about 48,000 pounds per square inch with that alloy today. Twenty years ago there were those who had trouble gettting 30,000 consistently. Let us say that the alloy has been improved some 60 per cent in strength. How? Simply by seeking out the causes of internal unsoundness and remedying them.

In case of the AN-QQ-A376-2 aluminum alloy a tensility of 40,000 pounds per square inch and 5 per cent elongation probably do not represent the ultimate. Careful examination of metal productive of good test bars sometimes shows that internal discontinuities remain. Here is one of the many challenges to the science and art of foundry metallurgy.

There is a trend in the AN-QQ-A376-2 alloy for tensility and ductility to increase simultaneously. Experience with and study of thousands of tests on other alloys indicates that when this trend occurs relative structural soundness often is involved. This occurrence in the AN-QQ-A376-2 aluminum alloy probably is of similar cause.

Freedom from leakage under a pressure test is no assurance of desirable maximum density throughout the section. Further, a casting that actually leaks is weak in the leaky section. In the literature in general there are numerous references to tendency for soundness in aluminum castings. Recently it is claimed that a high pressure die casting process has enabled certain cast products to compare very favorably with wrought products.

Soundness is a primary consideration in all cast alloys. Indeed its attainment is a *sine qua non* in competition. The jibes of the wrought alloys man are directed toward the "unreliability" (?) of castings because of their "inherent" (?) unsoundness. Great strides have been made in some castings fields. Steel and bronzes produced today are far ahead of the sometimes sorry structures encountered 25 years ago. Nor are the wrought alloys free from defects.

What is the situation in aluminum alloys? First, it may be said that early attention to design factors and the application of x-ray study and inspection have been beneficial in minimizing possibilities of gross discontinuities or defects in castings.

### Usage Is Not Severe

Second, many usages of cast aluminum are in general not severe, particularly in pressure and temperature applications. A great many castings have been made in permanent molds and as die castings, wherein some of the problems of dispersed and minute porosity and of pinholes are minimized.

There are in existence specifications which permit the treating (sealing) of aluminum castings. Where strength is no particular consideration it may be proper to indulge in such practices. However, as an easy way out, it hardly encourages developments in foundry metallurgy.

One of the evils to which some alloys are inclined is gas porosity—usually hydrogen in case of aluminum. On p. 538, *Transactions*, A.F.A., vol. 40, 1932, is shown a photograph of a porous ingot, and of an apparently sound casting made therefrom.

Unless means be taken to eliminate initial gas contamination it is too much to hope that ordinary foundry melting will be helpful in itself. The chances are that there will be additional contamination from products of combustion—such as water vapor from burning of hydrocarbon gases or oils, or even from the humidity of the air.

It is difficult to avoid the many sources of contamination entirely. Non-reactive gases such as nitrogen and chlorine are used to "wash" hydrogen from the molten bath. It would appear that much of the improvement resulting from such treatment is brought about by disper-


**CORDIP**

*The Uniform, Dependable*

*CORE WASH*

• To meet the demand for a uniform, "foolproof," easily prepared core wash, we offer CORDIP—a prepared powder complete with binder. Only water need be added to CORDIP to make a ready for use core-wash for dipping or spraying dry or green sand cores. Once the correct consistency (as measured by an hydrometer) is determined, it is an easy matter to always reproduce *exactly* the same wash. With present day high metal temperatures and close tolerances, a wash that is extremely dependable is definitely necessary. All guesswork, extra binders and extra mixing labors are eliminated.

CORDIP is manufactured in various grades to fit the entire field of core manufacture. It not only applies quickly and easily, but *turns* the iron to produce smooth, clean castings, thereby reducing scrap and cutting cleaning costs.

Tell us the type of work you do and the kind and size of cores you use and let us recommend the grade of core wash best adapted to your practice.

**OTHER MEXICAN GRAPHITE PRODUCTS**

MEXICAN PLUMBAGO
CORDIP
BLACKENING
No. 8 MEXICAN GRAPHITE
to reduce chill and hardness
MEXALOY
A
Super Refractory Material

*Write for Special Bulletins*

THE UNITED STATES GRAPHITE CO.
SAGINAW, MICHIGAN, U.S.A.

sion of micro-voids or pinholes. Pinholes, being discontinuous, are not (as a rule) sources of leakage on a pressure test, but their presence, even if microscopic in size, is not desirable. Continuous voids (referred to as incipient shrinkage in bronzes) if they occur, should be of more concern to the engineer.

Sachs and Van Horn (*Practical Mettallurgy*—1940) show differences between "gassed" and vacuum melted metal (p. 195 Fig. 128). Those authors refer to several methods of gas removal (p. 197). In their Chapter VIII, "Castings Production," references are made to and illustrations given of extensive usage of chills, multiple gates and the like, which of course foundrymen recognize as expedients rather than basic cures. Illustrations of practice as seen in the trade press frequently show these sometimes cumbersone and expensive (although for immediate results frequently needed) devices.

The ultimate objective is sound castings at lowest cost. Sound castings are the first essential. Aluminum founders are wise in going to whatever means may be necessary to obtain them. Aluminum has no "bad name" from unserviceable castings in the field. The writer has pointed out elsewhere the grave dangers of false economy and in making things "cheap." Yet the simpler and more economically a quality product can be made, the better the competitive position of the industry. It has been said that it is foolish to expect to pour metal into a hole in the sand and hope to get castings of (so-called) forging quality. Perhaps so, but strange as it may seem that is just what the progressive foundry metallurgist seeks. Frills have no place in his imagination.

### Had Better Understanding

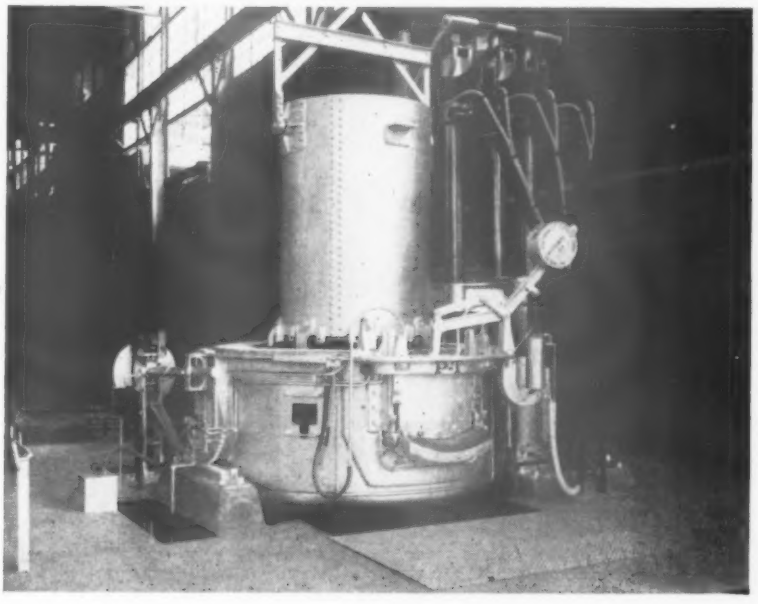
One is reminded of the arguments pro and con about pinhole porosity in steel some years ago. In that case somewhat better understanding of the intricacies of reactions during the melt and evolution of preventive measures solved most of the difficulties.

There sometimes is a tendency in the casting industry for the branches to strike at what they feel may be "easy" competition in their own industry. Some years ago cast steel replaced much cast iron. Today cast steel is given more attention to wrought steel, and malleable and gray irons are going to some degree into fields where cast and wrought steel prevailed. Perhaps in the aluminum field efforts to equal or exceed aluminum forgings on the one hand and to prevent inroads by plastics on the other would be well worth consideration. Where lightness plus strength are needed aluminum and magnesium alloys have some inherent advantages. Freedom from rust is another. Lightness, it must be remembered, is not always an advantage in all types of engineering service. Properties like damping capacity, wear resistance, freedom from galling and resistance to compressive loads often need be taken into consideration in engineering applications.

Whether certain of the more obvious peculiarities (including high heat of oxide formation) inherent in aluminum alloys preclude developments effected in some other fields or whether the art in this field is as yet somewhat behind that in other fields cannot be fairly stated. This inability to evaluate exactly is particularly evident when, as in this lecture, references are confined largely to the *Transactions*. If *Transactions* of the future contain a greater number of development records, more papers on various practices, and more extensive discussions, some possibility of better balanced review would exist.

The new A.F.A. Aluminum and Magnesium division certainly has most interesting work before it. If the ease of getting the ultimate in dense uniform castings can be promoted, the greater strength and toughness of such product (reflected in specifications) will do much to enhance the competitive possibilities of this product. The light alloys branch, after all, is relatively a new one in comparison to the other branches of the castings industry. That much has been accomplished by the light alloys branch is highly commendable. Further, recognition that there many be possibilities for further improvement is necessary if progress is to be made.

Development and its subsequent ap-

Top Charged
for Top Production

LECTROMELT top charge furnaces are increasing steel-tonnages by reducing charging time. This type furnace has been charged in as short a time as three minutes. Less charging time means more actual melting time and greater production. Illustrated is a 3 ton Lectromelt being charged. The top charge furnaces are manufactured in sizes from 100 tons to 250 pounds.

PITTSBURGH LECTROMELT FURNACE CORP.
PITTSBURGH, PENNA.

MOORE RAPID
Lectromelt
FURNACES

plication are essential for advance in foundry technology. Obsolescence is a subtle poison, but a sure and deadly one. Constant and consistent research is insurance against obsolescence, and investment for the future.

In research, as in all fields, personnel is a basic problem. All ideas stem from men; execution and accomplishment rest with men. Those who have the simplicity to wonder, the courage to try, the perseverance and ingenuity to accomplish, must have backing if industry is to grow and flourish.

Research involves both *how* and *why*, often called "practice" and "theory." Immediate interest usually is in the *how*. Impatience if not scorn often are vouchsafed the *why*. True enough, the *how often precedes the why*, at least to outward appearances. The *how* may be empirical, it may be skill, it may even be but rule of thumb, or it may be based on a *why*.

Once a *why* is mastered and applied many *hows* almost automatically suggest themselves. We consider Newton and Pasteur great because their discoveries of some *whys* revolutionized the fields of mechanics and medicine respectively. We honor Howe and Merica because their *whys* opened veritable floodgates of practical discovery.

Planned research is more effective than haphazard experimentation. The term research has been bandied about so much in the public press that the man on the street may feel that he is conducting research if he merely looks up a definition of a word in the dictionary. Likewise the founder who occasionally modifies a gate or alters the blast volume for his cupola may consider himself a research worker. In actuality such activities are but routine alterations. Research, as it is understood by the professional man, involves exactly controlled experimentation, precise and systematically recorded observation, and an attempt to correlate cause and effect. It is neither routine nor haphazard. Planned research often includes a generous portion of the *why* or so-called theoretical research.

Industrial research men are far the better for practical operating experience. Close contact with operating conditions is both revealing and stimulating. Some actual contact with the many and varied conditions of foundry practice should be sought, even by workers in pure theory.

### Research Merits Reward

Research is in itself a business and a profession. It involves expenditure, and return should be expected. While return may be direct, it often takes a long time. Sometimes it is intangible. In the latter case, although the results may be far reaching in ultimate economic significance, they may be very difficult to evaluate in concrete terms. Different groups of men often differ greatly in productive capacity. Usually the adage, "Genius is ninety-nine parts perspiration and one part inspiration," fits. Research sometimes is used for propaganda. Moreover propaganda sometimes masquerades as research. Research implies an objective approach—propaganda often the opposite. Research has honest advertising value, if the research is producing anything of significant worth to the customer. Yet we well know that in advertising there often is wishful thinking, not to say marked exaggeration.

Within the *Transactions* of the association, intellectual honesty must perforce be prevalent. In its open forum analysis and criticism must be faced. This is a brake on possible untoward tendencies.

Application often requires considerable skill. In some research work the variables are kept to a minimum, so that basic reactions and principles can be understood. The child of the laboratory may find tough going in the foundry—it is not sheltered from the variables. Some one with understanding of both research and practice must bridge the gap. Keen power of observation and real ingenuity are needed. Proficiency in the art as well as in the science is essential. The development of instrumentation and of test methods has helped greatly in making transition into practice more sure.

When application has been worked out, technical control comes into play. The advantage gained must be maintained to assure the cycle of success. Control frequently is regarded as mere


# Simplicity
## FOUNDRY EQUIPMENT
*hold a key position in casting production in 485 Foundries*

**This is shown by the statements recently made in writing by many of our users. Shown below are a few excerpts from some of these letters.**

★ ★ *"I sincerely believe that without the use and continued operation of the Simplicity shake-outs now in our plant, that it would lower our production between ten and twenty percent."*

★ ★ *"Your machines not only save labor during the shake-out operation, but we find the greatest savings in flask equipment and the castings come truer to form, particularly when shaken out hot."*

★ ★ *"We believe the Simplicity Equipment is one of the most vital in the Foundry Industry today."*

★ ★ *"We are using your Portable Screening and Conditioning Unit and couldn't do without it under the present conditions. In fact we save the price of the machine in six months time on man hour savings alone."*

**SIMPLICITY ENGINEERING CO.**
DURAND, MICHIGAN
*For Canada: Waterous Limited, Brantford, Ontario*

dull routine. Some of it is. Yet an alert control man actually in the foundry can be very valuable. His finger is on the patient's pulse at all times. He can observe untoward symptoms and seek means for their correction before minor troubles become major epidemics.

Foundries which conduct research directly are in the minority. Yet all foundries pay for research. In many cases those who pay most dearly are those who, without research, or even good control, have great and hidden losses. Oftentimes wastages and losses are unsuspected. Thorough checkup may reveal surprising things. Riding on the other fellow's developments is far from a safe or conservative business policy.

Preceding sections refer specifically to some of the developments in the art and science of foundry metallurgy, and suggest that these are important economically in maintenance and extension of the competitive position of the castings industry. This section considers some relationships beyond matters of technology and manufacture.

### Foundry Is Basic Industry

The material significance of the foundry industry was beautifully defined* by the widow of Seaman medallist Jesse L. Jones, as follows:

"*. . . the metal industry . . . is an essential, a basic industry. On its broad foundations rest all the manufactures, all the transportation, all the commerce of the world. In the heat and dirt and labor of the foundry, in the exacting and tedious toil of the laboratory, may you never forget the intrinsic value of your work. The strength and reliability of the iron, steel and aluminum, the copper, brass and bronze, which you produce, determine the safety and success of our whole modern industrial life. The progress of this great mechanical age waits your research. I believe it was because my husband so clearly visioned this, that he loved his work, and because he loved it he attained success in it.*"

The casting industry is but a cog within the huge industrial machine. Foundry metallurgy is but one factor in the castings industry. The machine has altered the life of man—his food, his clothing, his housing, his transportation, his communication—it is the medium through which products of mine and farm and forest—from land and sea and air—are made available. Failure to integrate practices in political economy with the developments of the machine age has resulted in a paradox. The machine age brought and brings potentiality for peace and prosperity beyond that ever known. We have war, death, suffering, hunger and waste. We hate, we curse this paradox of misery and want co-existent with potentiality for happiness and prosperity.

The enemy has evoked the beasts' law of claw and fang, more effective, more deadly, through application of the machine. Our confidence in victory is based not alone on the bravery of our boys, and the skill of their leaders, but also on our greater proficiency in the evolution, production, and application of the machine.

The castings industry has played and is playing an important part in the war effort. If courage and vision be evoked, it can and will play an important part in the era of peace.

Will those who have won the victory over tyranny be content with regimentation? Will you who have played a part in creation of the machine continue to remain content with the paradox?

War is a great stimulus to technical achievement. May not an added by-product be a greater social consciousness within us; and in the affairs of the association?

Is business run for profit alone? Is not the real end service, social service, if you please? An immediate objective of foundry metallurgy is the evolution of a better and less costly product. Exploitation of such a product aids the casting industry to maintain and improve its competitive position. Alloys which are safer, more useful, and more economical materials of construction are an objective. And the machine of which the material is a part has as its reason for being that it saves the labor of men, and promotes their safety and material happiness. Can we then evaluate castings

*Transactions, American Foundrymen's Association, vol. 37 (1929), p. xxxii.


Schundler

BENTONITE

AVAILABLE FOR IMMEDIATE SHIPMENT

SCHUNDLER BENTONITE, Fesco Fire Clay, Fesco Bond and other foundry products are always sold with a technical service fitted to your requirements . . . a service provided by the largest scientific staff working in the best equipped laboratory in the Bentonite industry.

**24 HOUR SERVICE to most Foundry Centers . . .**

| | |
|---|---|
| Akron, Ohio | H. S. Stoller |
| Birmingham, Ala. | Foundry Service Co. |
| Boston, Mass. | Klein-Farris Co., Inc. |
| Chattanooga, Tenn. | Frank Robbins, Jr. |
| Chicago, Ill. | B. J. Steelman |
| Chicago, Ill. | Wehenn Abrasive Co. |
| Cincinnati, Ohio | Delhi Foundry Sand Co. |
| Coldwater, Mich. | The Foundries Materials Co. |
| Detroit, Mich. | The Foundries Materials Co. |
| Dallas, Texas | Barada & Page, Inc. |
| Edwardsville, Ill. | Midwest Foundry Supply Co. |
| Houston, Texas | Barada & Page, Inc. |
| Kansas City, Mo. | Barada & Page, Inc. |
| Long Island City, N.Y. | F. E. Schundler & Co., Inc. |
| Los Angeles, Cal. | Independent Fdry. Supply Co. |
| Milwaukee, Wis. | Thomas H. Gregg |
| Minneapolis, Minn. | Smith-Sharpe Co. |
| New Orleans, La. | Barada & Page, Inc. |
| Oklahoma City, Okla. | Barada & Page, Inc. |
| Philadelphia, Pa. | Penn. Fdry. Sup. & Sand Co. |
| Portland, Ore. | Miller & Zehrung Chemical Co. |
| St. Louis, Mo. | Midwest Foundry Supply Co. |
| Oakland, Cal. | Industrial Supply Co. |
| Seattle, Wash. | Carl F. Miller & Co. |
| Toronto, Canada | Muir Foundry Supply Co. |
| Tulsa, Okla | Barada & Page, Inc. |
| Vancouver, B. C | Fleck Bros. Limited |
| Wichita, Kans | Barada & Page, Inc. |
| Mexico D. F., Mexico | N. S. Covacevich |

F. E. SCHUNDLER & CO., INC.
520 RAILROAD STREET
JOLIET, ILLINOIS

Schundler

**IMMEDIATE DELIVERY**

**on the**

# NEW

**"RAPID" HAND SQUEEZER**

**$122.00**

**Will handle a lot of your bench jobs and save you money by trebling your production.**

**Handles flasks up to 16 x 30 inches.**

**Comes complete with benches.**

**Portable or Stationary Type.**

★

**"RAPID" R9X JOLT**

***30% increased jolt capacity***

**$205.00**

**JOLT VALVE KNEE-OPERATED**

**A Foundry producer of good molds for over 20 years.**

**Simple to operate.**

**Squeeze Plate quickly adjusted.**

**Low initial cost.**

★

***Write for NEW descriptive folders and Price Lists.***

# PIONEER

**MANUFACTURING CO.**

*Molding Machine Manufacturer for Over 20 Years*

**MILWAUKEE (West Allis) WISC.**


only on a price per pound basis? Shall we merely grab blindly amid sand and hot metal? Cannot we take pride in our calling and seek understanding and respect from our fellow men?

Quoting Steinebach°. "Today the war effort and the foundry industry suffer from lack of united action on foundry problems. Both government and industry are at fault."

Whether it be war or peace, united action is necessary. Courage and vision are needed for unity within our industry and in our Association. Beyond these, unity is needed in industry in general, and integration of all with the affairs of government.

Education and the promotion of research and development are recognized functions of the association. The A.F.A. has been a leader in encouragement, organization, and publication of research and information in the field of foundry metallurgy. These accomplishments are reflected in improved products and practices. It is desirable that such accomplishments be not only continued but also expanded. Careful planning is necessary to assure this.

### Avoid The Pitfalls

There are things that are wise to do, other things that are important to avoid. Many able men have supported the Association within its 47 years of existence. We see the things that they have done. We rarely see the things that they carefully avoided doing. The last perhaps have been equally important toward success.

Numerous specific problems are dealt with in association work. There also are many generic problems in foundry metallurgy. Usually such work, on generic problems, can be done best by a group or groups representative of the whole industry. It is rare that a single firm can go as far as might be desirable in fundamental problems, problems that concern the industry as a whole. Here lies a field for further extension of association effort.

Progress within and by the association has been a product of co-operative effort. Some of this accomplishment has been a result of long range planning. Some perhaps "just grew." In considering perpetuation and expansion of technical advance let us always remember that co-operative effort has been the foundation and mainspring of progress. Encouragement of more concerted approach on generic problems is desirable. Any regimentation is to be most carefully avoided. Individual and competitive effort is the life of research as well as of trade.

In total or partial sponsorship of a research project by the association there are concurrent dangers. One is impatience by members with any beside immediately applicable results and with so-called theoretical research.

A difference between theoretical re-

°THE FOUNDRY, vol. 71, No. 1 (1943), p. 65.


***NOW! Absolute Pattern Contour***

**for**

**Your Castings**

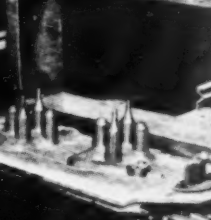
***with***

# BUCKEYE

(PATENTED)

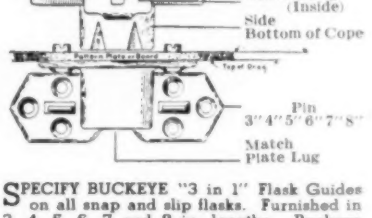
**"3 in 1"**

**FLASK GUIDES**



**EVEN A NOVICE** can accomplish a lift equal to a skilled molder—with *improved* Buckeye "3 in 1" Flask Guides! These Buckeye Patented Flask Guides, with "3-V" construction insure *true perpendicular lifts* with the least possible effort.

**Save time! Save replacements!** It's impossible to wear a shoulder on Buckeye pins. But above all—save molds—Copes can't shift! Absolutely no rocking while removing or replacing the cope.




SPECIFY BUCKEYE "3 in 1" Flask Guides on all snap and slip flasks. Furnished in 3, 4, 5, 6, 7 and 8 in. lengths. Buckeye Match Plate Lugs or Guides available for (or interchangeable with) all sizes of pins. Write for full details and money-back guarantee offer—today!

***The***

**BUCKEYE PRODUCTS COMPANY**

**7022-24 Vine Street, Cincinnati, Ohio**

*Manufacturers of*

**Foundry Supplies, Core Oils, Refractory Cements, Foundry Facings and Equipment**

search and applied research is one of temporary objective. In "theoretical" research knowledge is sought, in the hope and expectation that it will serve as a broad foundation for many applications. In applied research a more specific and limited objective, the solution of one particular problem, is pursued. Not infrequently applied research may lead indirectly to the development of theory, particularly if properly directed.

Some may take the attitude that the association should do their research for them. Valuable though the work of the association is, it does not take the place of nor does it compete with privately sponsored work. President Forbes says° "Although the foundry industry is fifth in size in the United States, it is nowhere near that in point of the amount of attention it gives to study and research." The association can not in itself bridge that gap.

Committee work has been a fertile source of progress in the association. Joint efforts plus individual publications represent not alone good will but also research expenditures that run not into the tens, but into the hundreds of thousands of dollars. The association has and will promote logical and co-ordinated extension of committee work. Among the ways in which the association has done and can do much to promote the well-being of the industry are:

(1) Making accessible the results of work already done. Moldenke many years ago wrote°° "The transactions of the foundrymen's associations and the great iron trade journals are still the repositories of this growing fund of information, which nevertheless requires discriminating study to separate the kernel from the chaff."

Today the problem is multiplied many fold. This is not alone because of the many media. Correlated and critical abstracts and symposia are needed and are of great value.

(2) Help meet the need for elementary and clear-cut expositions both on "theory" and on "practice," useful both to the beginner and to refresh the older man's knowledge.

(3) Sponsoring or aiding research and development. Among possible approaches are:

(a) With its own staff and equipment.

(b) By grants to its committee for pursuit of approved problems.

(c) Through hiring the services and facilities of universities, research institutes, consultant, establishing fellowships, and other agencies.

(d) In co-operation with agencies, such as other technical and governmental bodies.

Whatever approach or combination of approaches be chosen, consistent plan and concerted action are essential. Mere enthusiasm is no substitute for analytical judgment and for vigorous and economical prosecution.

An objective of research is the maintenance and improvement of the competitive position of the industry. The actual work may concern such items as:

(a) The raw materials used, directly and indirectly.

(b) The product, castings. This includes such factors as mechanical properties, use of alloys and study of design.

(c) The processes—for example, melting and molding.

(d) Applications and uses of products—one of the at present weakest links in the foundry structure—as long as thought is centered on price per pound.

(e) Fundamental principles and theory.

(4) Promoting justifiable extension of usage of cast products.

(a) Publication such as the *Cast Metals Handbook* provide "current and authoritative information as an aid to the engineer dealing with the many products of the foundry." This has been and should be a product of committees. However, somewhat more thought

°*American Foundryman*, vol. 5, No. 1, Jan. 1943, p. 2.

°°Moldenke, R., *Principles of Iron Founding*, McGraw-Hill Co., New York.

LANLY
CORE AND MOLD OVENS

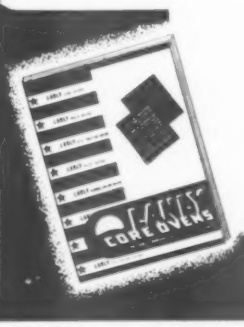
The Lanly personnel includes engineers especially trained and widely experienced in the designing of core ovens and mold dryers for baking, drying, curing, and processing.

Unhampered by outmoded designs and methods and thoroughly familiar with all modern and tested units, designs and practices,

....CONSTANTLY GAINING IN POPULAR ACCEPTANCE....

they have been uncommonly successful in developing equipment. The Lanly curve has moved steadily upward—in volume of sales —in size and scope of line manufactured —in acceptance by companies whose exacting demands constitute an endorsement of products purchased.

If in the market for standard or special equipment let us submit a recommendation and quotation for an oven or furnace that will be thoroughly guaranteed as to construction and performance. And write for our new catalog describing *"Ovens for Industry"*.




THE LANLY COMPANY
750 Prospect Ave. CLEVELAND, OHIO

1905 **Strand** 1943

FLEXIBLE SHAFTS

**FLEXIBLE SHAFT MACHINES**

**OF HIGH QUALITY**

SIXTY TYPES AND SIZES

THREE SPEEDS VERTICAL ¼ to 1½ H.P.

ROTARY FILES

HEAVY TYPES FOR THE FOUNDRY

ROTARY CUTTERS

MACHINES FOR METAL PATTERN MAKERS

*Send for Our Catalog*

**N. A. STRAND AND COMPANY**

5001 NO. WOLCOTT AVE. CHICAGO 40, ILLINOIS

***When Is A Nozzle "Cheap"?***

A nozzle certainly is not cheap if it wears out in a few hours, as most low-priced nozzles do.

The bore of a short-lived nozzle enlarges so rapidly that you can't help wasting costly compressed air—to say nothing of the increased cleaning time required, due to decreased nozzle efficiency. If a ¼" nozzle bore enlarges only 1/16" at 80 lbs. pressure, power cost goes up 76c in 8 hours (based on 1c per H.P. hour).

Frequent nozzle changes are costly, too, because they take up the operator's time and slow down production.

To be free of these costly conditions, we recommend the use of low-cost A-H Long-Lyfe Nozzles. A ceramic insert of nearly diamond hardness gives them a service life obtainable only in nozzles costing two to five times more. Used by prominent foundries everywhere. Write for Bulletin No. 17.

**AMERICAN FOUNDRY EQUIPMENT CO.**

505 S. BYRKIT ST.

MISHAWAKA, INDIANA

PATENTED
U. S. PATENT—2,278,442
CANADIAN PATENT—491,068



$8.00 EACH F.O.B. Factory (For ½" size and under)

**AMERICAN-HEANIUM *LONG-LYFE* NOZZLES**

might be given the achievement of a consistent plan.

(b) Symposia in cooperation with consumer-producer groups, the American Society for Testing Materials being a group so recognized.

(c) Co-operation with code and specification making bodies. Not infrequently the foundryman has little or nothing to say about codes—some restrictive—which define the applications of cast product. Among groups are those of governmental agencies and of consumer bodies.

(d) Joint effort with other producer groups—say as with the American Welding Society in matters of cast-weld products.

(e) Thorough correction of handbooks and published metallurgical data, which often are out of date or misleading. Should the gray iron man smile or swear when he reads in a recent reference book that "Cast iron is brittle . . . Tensile strengths vary from 18,000 to 26,000 p.s.i. . . . Semi-steel . . . High test cast iron . . . A term for cast iron that has been superheated in the melting for pouring and then the castings given a treatment to prevent chill in order to produce a tough white iron"? The fault is not fully with the authors and publishers.

**Should Furnish Information**

(f) Encouragement of and constructive help for writers of papers and articles, as in the *Transactions* and the *American Foundryman*.

(g) Furnishing of many descriptions of successful service applications, and finding out causes of unsatisfactory performance, and getting these before the designer and engineer, the foundryman, and the metallurgist.

(h) Arousing foundrymen toward greater confidence in the ultimate value of their product, and to greater knowledge of its usages—in short to promote constructive "sales-mindedness," on basis of merit in use rather than on basis of first cost to the customer.

(i) Aid to schools in getting the story of castings properly before their students, and in the selection of courses fitted to training foundry workers.

Many other approaches might be mentioned. Too often we think of gray iron, malleable, steel, nonferrous, and the light alloys as separate and distinct fields. They are not. Composition, time, and temperature are fundamentals. Differences between alloys are in degree rather than in kind. Basic principles are alike. Useful analogies are common, even if too infrequently perceived.

Management is acutely aware that functionalization has produced the operator in contrast to the craftsman. Specialization also may produce the nonferrous technician, the iron expert, and so on rather than the all round metallurgist. Restricted function, specialization, has a useful place, but it has its dangers. Intensive work may well be directed to a specific alloy, but the question of adaptability of the findings to other alloys is ever to be borne in mind

This is especially so in association work.

The association has established a Foundation. In the initial resolutions, "consistent plan and concerted action" were emphasized as guiding principles. Provision was made for skilled and able leadership. It is understood that the Foundation's work would be supplementary to that of existing agencies within the association. Further, the Foundation is intended to help and facilitate the working and perpetuation of existing activities, not to supplant them. While there is room for a more consistent plan and greater concerted action in any organization these must be achieved by cooperation. The American Foundrymen's Association has grown strong because of the good will and freedom of action among members. Any hint of regimentation would destroy invaluable initiative.

To build soundly for the future is an objective of the association. The establishment of the Foundation can well be another valuable step in that direction, and of material aid in the carrying on of and in extension of the activities of the association.

### Note Many Changes

During the past 20 or 25 years many changes have occurred in the foundry industry. In an endeavor to outline the trends, more particularly of foundry metallurgy, the author, beside or beyond compiling a review, has presented brief expositions of some unpublished research and mentioned problems which merit further study. While the association has played an important role in the advancement of foundry metallurgy, suggestions are made on how it might promote further development and advance. Those include a seeking of a broader viewpoint toward technical advance and attaining a greater social consciousness by both industry and individual.

The aluminum castings industry was just coming into commercial being some 25 years ago. Practical casting of magnesium alloys was undeveloped. Cast steel of controlled quality, as we know it today, was rare. Accurate understanding of the influence of temperature under the pearlitic interval was among things lacking in the malleable field. With but few exceptions gray iron was judged more on basis of weight and machinability, than on basis of strength and true suitability for the service. Nonferrous alloys were made, by and large, to traditional formulae and by empirical methods. In all fields there has been advancement in quality of castings and in methods of manufacture.

Deve'opment of scientific methods of control and research, and the applications of these to foundry work have been numerous. Twenty-five years ago a simple direct combustion method of determining carbon content of cast iron and steel was quite new. Practical pyrometry in foundries was in an early stage. Measured control of sands was not practiced. Radiography as applied to commercial castings seemed far-fetched. "Creep"


TRIED AND TESTED FOR MORE THAN 25 YEARS

Shelton Metallic Filler was "reared" in the nation's foundries. Today with foundrymen the length and breadth of the land its use is *standard practice* and re-orders are *automatic*. It's a quality cement that always does a quality job.

Shelton Metallic Filler is a powder form, quick drying, air setting, cement. Any one can apply it. Just mix with cold water to a stiff paste and apply with putty knife or trowel. It sets quickly to a flint-like hardness, matches the casting in color, and can be dressed down with a file. Your foundry materials dealer can supply it promptly in 1, 5, 25 and 100 lb. containers. *Ask for it by name.* Sample free on request.

SHELTON METALLIC FILLER

A HARD-SETTING METALLIC CEMENT FOR FILLING IMPERFECTIONS IN CASTINGS.

PRODUCT OF

AMERICAN CRUCIBLE COMPANY, Shelton, Conn.

This Chain Hoist gives you 3 ADVANTAGES!

Three of a steel mill's battery of READING CHAIN HOISTS in the grinding department.

● Catalog No. 58 will give you the kind of useful information you need when selecting chain hoists. For your free copy, drop us a note on your company letterhead.

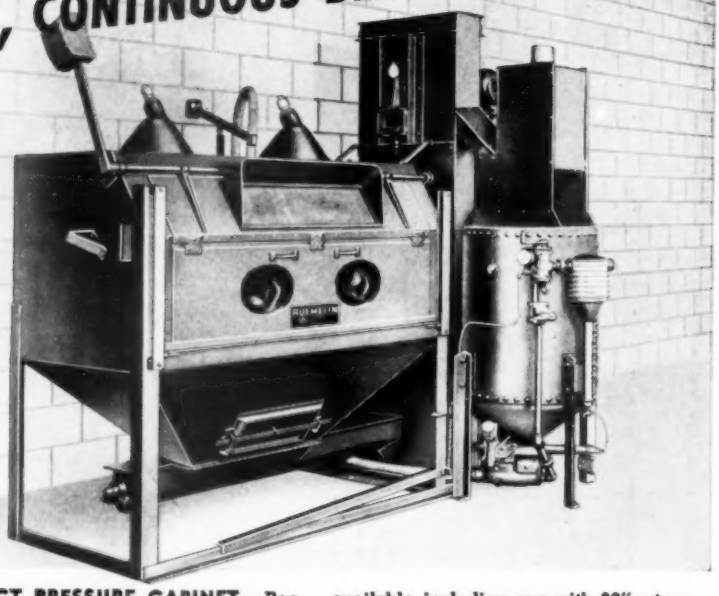
**Long time service! Speed with real safety! Easy maintenance!**

For ALL of those features specify READING CHAIN HOISTS. They are engineered to stay on the job shift after shift. Maintenance consists of regular oilings. There is a READING CHAIN HOIST for practically every lifting job in your plant — from ½ to 20 tons.

**Reading Chain & Block Corporation, 2108 Adams St., Reading, Pa.**

READING CHAIN HOISTS·ELECTRIC HOISTS OVERHEAD TRAVELING CRANES

FAST, CONTINUOUS BLAST CLEANING!



**DIRECT PRESSURE CABINET**—Recommended for blast cleaning castings, forgings, heat-treated parts or wherever quick action is a necessity. Abrasive elevator system delivers cleaned abrasive to nozzle automatically. Cabinet size shown is 72" x 36". Other sizes available, including one with 60" rotary table. Write for bulletin 32-A.

• • •

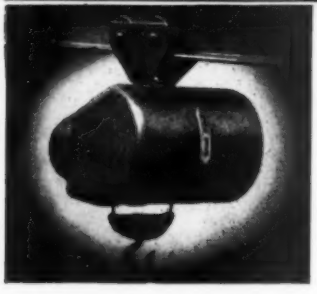
Also manufacturers of Welding Fume Collectors, Abrasive Handling Systems, Cloth Dust Filters, Blast Rooms, and accessories.

RUEMELIN MFG. CO., 3850 N. Palmer St.
Milwaukee 12, Wisconsin

**RUEMELIN BLAST CABINETS**

A 4098-½

CONCO HANDLING EQUIPMENT



**TORPEDO ELECTRIC HOIST**

Available in 250-, 500- and 1000-lb. capacities for hook, bolt or trolley suspension. Features push button control, electric brake, positive limit switch, double drum construction. For *prompt* shipment.

**JIB CRANE & HOIST**

Revolves in complete circle; wall bracket type also available. Either model is ideal for foundry use in combination with a Conco Hoist. Real floor space savers.

**SPUR GEAR HOIST**

A speedy, well-built hoist in capacities from ¼-ton through 20-tons. Excellent for foundry use in connection with various Conco light cranes and trolleys.

**DIFFERENTIAL HOIST**

Light weight; low cost. Pays with even occasional use. Available in ¼-, ½-, 1-, 1½- and 2-tons. With Conco I-Beam Trolley is top-flight low-cost setup.

*WRITE TODAY* for literature on Conco Cranes, Hoists and Trolleys for foundries. Good handling equipment speeds production.

CONCO ENGINEERING WORKS
Division of H. D. Conkey & Company 53 Grove St., Mendota, Illinois


testing was undeveloped and practically unknown. The metallurgical microscope was, in the castings field, a scientific toy rather than a practical tool. Use of the electric furnace was just starting. Usages of "alloys" in cast irons were rare. Heat treatments in most shops were, by and large, crude. Age hardening was barely known and not at all understood. Many more examples might be given.

It is during this period that the automobile industry became huge. This in turn promoted expansion in oil and other industries. Chemical industries also were greatly expanded, following the breaking down of the German monopoly. Agriculture was more mechanized. These and many other developments necessitated the usage of large amounts of metals—including cast metals. There were needs and demands for greater strength, less weight, more resistance to corrosion, better wearing properties, improved dynamic characteristics, greater stability and reliability when exposed to higher temperatures and stresses, and so forth.

### Foundry Moved Forward

The castings industry has been markedly influenced by general manufacturing progress. It has, to an appreciable degree, taken advantage of developments in scientific metallurgy and in the newer methods of measurement, instrumentation and control. There have been many advances in mechanical handling and working in the foundry—in transportation of materials, in cleaning, in machine molding and the like. Some branches have taken extensive advantage of these developments. In the author's opinion the greater number of foundry managements have paid more attention to advanced mechanization than to possibilities within the extension and application of metallurgical science.

This war is having a tremendous effect on the metals industries. Stern necessity has smashed complacency to shreds. A more fluid, a more mobile attitude is likely in the bitter post-war competition. War throws old practices out of their old grooves and channels. Clear thinking and swift action are needed in war against the common enemy. They will be needed no less by industries in the post-war reconstruction.

D. J. Reese stated* "If the base metal was designed for alloying, these same foundries would require about half as much alloy—it means that they require 3 and 4 and 5 pounds of alloy to do the job that 1 pound of alloy could do." The preceding quotation suggests that lack of metallurgical knowledge always has been paid for by the founder and dearly so. It infers that the easy way out, trying to get something for nothing, not only has cost the founder and the consuming public a pretty penny in normal times, but also may lead to the squandering of strategic resources in war.

The castings industry undoubtedly has

*THE FOUNDRY, vol. 71, No. 3, March 1943, p. 81.

MELTING

"ALNOR"

Pyro-Lance

A RELIABLE PYROMETER

• A long-time foundry-favorite. Gives accurate readings and will stand up under the hard usage of furnace room and pouring floor.

Shock-resisting movement is one of its many features. Is self-contained and uses the enclosed couple, gets true temperature readings below the surface and outlasts bare-wire styles for Brass, Bronze and Copper.

HEAT TREATING

"ALNOR"

RECTANGULAR INDICATING PYROMETER

• An indicating pyrometer with a long scale for high accuracy. Ideal for use with heat-treating furnaces, ovens, and operations where permanent accuracy, rugged construction and close readings are essential.

BLOWER SYSTEMS

"ALNOR"

VELOMETER

• This all-purpose velocity meter indicates air velocities directly and instantaneously on the scale if f.p.m. without the necessity of timing or mathematical calculation.

CHECKS YOUR EXHAUST SYSTEMS

*Write us for descriptive folders and prices.*

ILLINOIS TESTING LABORATORIES, INC.

418 N. LaSalle Street • Chicago, Illinois

been (as suggested by Reese) wasteful in usages of materials. A lesson of this war is that as a nation we have been indeed foolishly wasteful in many ways. There are far worse examples of wastage elsewhere than those examples found in the castings industry.

We have, in the American Foundrymen's Association, a group "to promote the arts and sciences applicable to metals castings manufacture—"[oo] The association is an educational and technical society for the whole castings industry. Men from different and often competing foundries have found that it is of great value to trade ideas and help each other. Perhaps it is not equally clear to the branches of the industry that they too have much in common, and that much remains to be done in the matter of concerted attack on the educational and technical problems shared by all.

### Rate of Progress Accelerative

Review of technical advance teaches clearly that rate of progress is accelerative. The association well may have just pride in its accomplishments. You all should remember that even more swift progress is needed to meet the challenges of the future. And what is the association? It is a group of individuals. Since it is composed of individuals, the association advances in proportion to the degree that individuals support it actively, personally and financially. Conversely the association will retrogress if individuals regard it as a mutual admiration society, pay for nominal membership, and let direct interest lag.

It has been a great privilege to be permitted to prepare and deliver this lecture. If younger men find therein some encouragement toward progress in the science and art of foundry metallurgy and if their seniors are reminded that there yet remains much for them to accomplish through consistent plan and concerted action, its particular purpose and conception will be served.

The following words of closure are adapted from those of a great teacher and leader in the castings industry, the late Richard Moldenke—

*To The*
*FOUNDRYMEN OF AMERICA*
*With Whom I Have Worked,*
*From Whom I Have Learned,*
*To Whom This Lecture Is Dedicated,*
*In Grateful Memory Of Unvaried*
*Kindness Constantly Received.*

J. W. Bolton.

*April* 29, 1943

[oo] American Foundrymen's Association By-Laws, Art. 1, sec. 2.

### References

[25] Gann, J. A., and Brooks, M. E., "Founding Magnesium Alloys," *Transactions*, American Foundrymen's Association, vol. 43 (1935), pp. 591-614.

[26] Brooks, M. E., and Winston, A. W., "Magnesium Foundry Practice," *Transactions*, American Foundrymen's Association, vol. 49 (1941), pp. 165-187.

[27] "Recommended Practices for Sand Cast Magnesium Alloys," *Transactions*, American

FOSECO

*Products that make BETTER castings!*

TODAY . . all specifications stress quality. Examiners are quick to reject inferior castings.

TODAY . . more and more foundries are using more and more "Foseco" products.

THERE'S A REASON!

CUPREX

for Nickel, Copper and their Alloys

• Multiple effect—covering and degassing.
• Prevents gas absorption.
• Pressure tight castings.
• Improved physical properties.
• Added with first charge, immersion unnecessary.

R-6

for Gun Metals and Bronzes

• Eliminates gases and blow-holes.
• Secures dense castings.
• Increases tensile and elongation.
• Reduces sulphur and other impurities.
• Cleans the surface.

ALUMINUM REMOVER

Sound Castings, despite aluminum contamination

• Removes Aluminum and Aluminun Oxide from Copper and Nickel Alloys.

IRON REGENERATOR

for Iron and Steel

• Removes iron oxide.
• Removes gases and slag inclusions.
• Increases fluidity.
• Increases physical properties.
• Improves machining.

THESE and other "Foseco" products will solve your casting problems quickly, efficiently. For detailed information, write stating nature of problem and alloy you are casting.

FOUNDRY SERVICES, INC.

280 Madison Avenue

New York, N. Y.

No. 90 IRON-OXIDE

HAVE YOU TRIED IT WITH YOUR CORE SAND MIX?

ORDER A SAMPLE TODAY!

**DID YOU EVER TRY "SOAKING" CORE EQUIPMENT CLEAN?**

It's easy, if you have TAMMS No. 100 Liquid CLEANER! Yes, you can clean core boxes, drier plates, blow plates and core vents in a fraction of the time! Non-harmful to metal! No scouring or scraping! No "elbow grease" needed! Investigate the "soak-'em-clean" method today!

**ARE YOU USING TAMASTONE Pattern Compound?**

It's a fact, TAMASTONE has stepped up production as much as 400%—cut costs 75%. It converts loose and metal gated patterns into one or more match plates that are good for thousands of impressions. Gives micrometer accuracy on separate cope and drag patterns! Get *"in the swim"*—order *TAMASTONE now!*

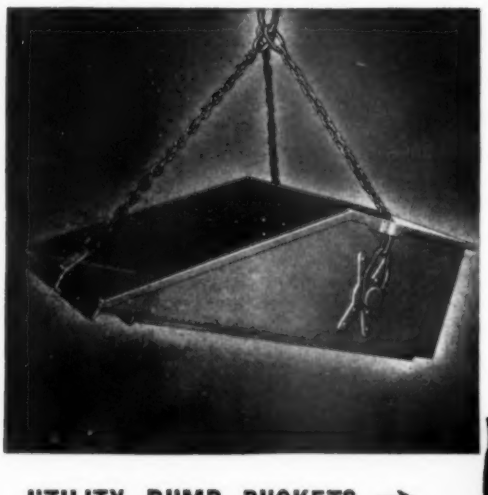
**PREVENTS CORE SAND FAILURE!**

Grey iron and steel foundries have learned that inexpensive No. 90 Iron Oxide added to their core sand mixtures improves castings, cuts cleaning costs and speeds production! No. 90 added to the extent of only 2% prevents core burning, veining and penetration. One of the nation's leading foundries states, "It is every bit as satisfactory as some of the proprietory materials sold at a much higher price." Why not try it yourself? Write for sample today!

**TAMMS SILICA COMPANY**

228-F N. La Salle St. Chicago, Illinois



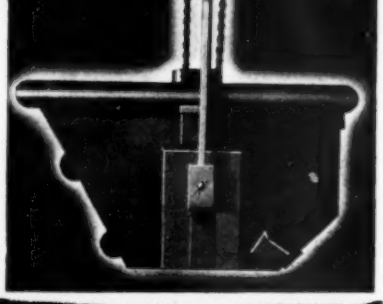


GOOD DELIVERY

★

**DISTRIBUTION BUCKETS**

Carries up to 5 tons safely. Ejection automatic on removal front chain. This unit has met enthusiastic response from numerous foundry users.



**UTILITY DUMP BUCKETS** ➔

Capacities to 200 cu. ft. Perfectly balanced and locked in transit. Automatically ejects load and rights self by tripping locking lever. Ruggedly built.

**WRITE FOR OUR NEW CATALOG**

*CORE OVEN TRUCKS—CORE-RACKS — JIB CRANES — STEEL FLASKS — BUCKETS — SPECIAL EQUIPMENT*

**WM. F. EICHFELD & SONS CO.**

*ENGINEERING SPECIALISTS IN METAL*

2551 North 30th St. MILWAUKEE, WISC., U. S. A. Phone: KILbourn 7060



Foundrymen's Association, vol. 44 (1936), pp. 33-50.

[24] Basch, D., and Sayre, M. F., "Foundry Treatment and Physical Properties of Silicon-Aluminum Sand Castings." *Transactions*, American Foundrymen's Association, vol. 32, Part 1 (1924), pp. 350-383.

[25] Rowe, H. J., and Gingerich, E. M., "Practical Foundry Considerations for Improving the Soundness of Aluminum-Alloy Castings." *Transactions*, American Foundrymen's Association, vol. 40 (1932), pp. 527-546.

[26] Gillett, H. W., "The Role of Silicon in Non-Ferrous Castings." *Transactions*, American Foundrymen's Association, vol. 41 (1938), pp. 413-441.



In preparation of this lecture the writer has received helpful advice and criticism from several individuals and groups. To these he extends sincere thanks.

Among these, the following authorities reviewed the sections indicated: Hyman Bornstein (Gray Iron), Charles W. Briggs (Steel), Dr. Guilliam H. Clamer (Non-ferrous), Howard J. Rowe (Light Alloys), Dr. Harry A. Schwartz (Malleable Iron).

Frank G. Steinebach and Edwin Bremer of THE FOUNDRY helped in review and clarification of the manuscript as a whole.

Dr. Austen J. Smith, the writer's assistant, helped throughout the preparation of the manuscript sections.

The writer also is particularly indebted to the Lunkenheimer Co., Charles A. Brown, general manager. A policy of consistent backing of research development for some years, a co-operative attitude toward engineering society activities, and the facilities available to the writer have been not only useful, but also essential to this undertaking.


## Offers Studies of Employe Morale

A new series of three studies of employe morale is being offered by the Metropolitan Life Insurance Co., New York. The series treats the subject from three angles. "Planning and Organizing the Morale Program" is a study which shows the behind-the-scenes work that is essential before an effective morale program can begin to operate with the employes. The second, "Stimulating and Maintaining Employe Morale," brings together the practices which obtain in some 45 well-known industrial companies for introducing and keeping alive the feeling of responsibility and "war consciousness" among employes.

"Reducing Absenteeism Through Employe Education" undertakes to show how companies wage an unrelenting fight against preventable absence from the job. It reproduces the hard-hitting publicity that has been so successfully used in making absenteeism unpopular in the plant and office. Copies of any or all of these reports may be obtained from Policyholders Service Bureau, Metropolitan Life Insurance Co., 1 Madison Avenue, New York (10).

---

More than 17,000 Caterpillar Tractor Co. employes set an all-time safety record during the first 6 months of 1943 when they established a frequency rate of only 4.36 lost-time accident cases per million man hours of work, it is announced recently by H. S. Simpson, safety engineer. Two other all-time marks were set up during the month of June when but seven lost-time cases and a frequency rate of 2.08 were recorded.

## Safety Equipment Purchase Plan

Employes of essential industries may use their employers' preference rating applicable to maintenance, repair and operating supplies in purchasing safety equipment, under a regulation announced by the War Production Board. Such ratings may be used by an employe only for the purchase of safety equipment to be used exclusively in his employer's business.

In order to use his employer's rating for the purchase of such equipment, an employe must obtain from him a certificate, indicating the type and size of safety equipment required, as well as certifying that it is required in the employer's business, that the employer requires the employe to furnish the item. The employe also must certify that he does not own or possess any similar item which will serve the same purpose. Safety equipment which may be purchased in this manner includes, among other items, various types of clothing but does not include safety shoes.

## Government and the Stove Industry

"The Government and the Stove Industry" is the title of a booklet prepared for the Institute of Cooking and Heating Appliance Manufacturers Inc. It is a wartime story of the industry's experience with government agencies, detailing by dates, starting with June, 1941, the various government orders, regulations and restrictions affecting manufacturers of cooking and heating appliances.

These various edicts, described as "sometimes complicated sometimes impossible of interpretation even by the Division issuing them, sometimes mutually contradictory," are said to have discouraged production and caused a serious shortage of some types of cooking and heating stoves. The memorandum points out the need for unified control over the industry's problems, including production, rationing and pricing.

## Book Review

*Symposium on Radiography*, cloth, 256 pages, 6 x 9 inches, published by the American Society for Testing Materials, Philadelphia; price $4.00.

This volume containing 18 technical papers by outstanding authorities on radiography should develop a better understanding of such tests and their significance on the part of both consumers and producers of materials. The major part of the book includes the technical contributions in the 1942 symposium held by the society, but an important part is the collection of the 1936 symposium papers; several of which have been revised extensively, some condensed.

Contributions include those on principles of radiography, foundry and miscellaneous applications, gamma-ray radiography with instructions for using radium, and the problem of inspection. Other topics covered are applications to production problems, welds and weldments, magnesium aircraft castings, correlation of mechanical properties and radiographic appearance of magnesium alloy castings, million-volt X-ray unit, high-voltage X-rays in the boiler shop, welded high-pressure power plant piping, apparatus used in radium radiography, exposure meter, cassette design, precision radiography, X-ray film evaluation, industrial X-ray protection, and recommended A.S.T.M. industrial radiographic terminology.

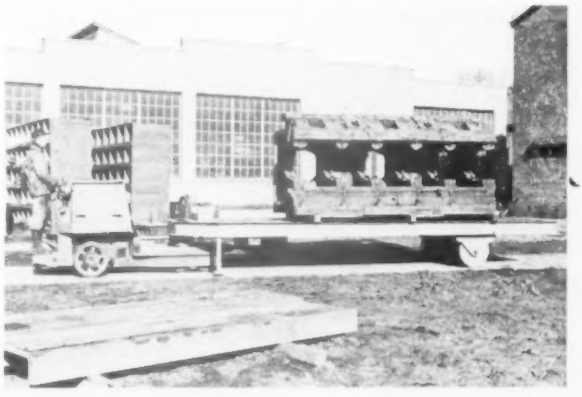
## Additional Freight Cars to be Built

Construction of an additional 5801 new freight cars this year from steel allocated to the railroad industry for the third quarter has been provided for. This means that upwards of 32,000 new cars will be built in 1943. Breakdown of the 5801 cars according to type is as follows: Box, 2724; gondola, 262; hopper 2150; refrigerator, 300; flat, 365.

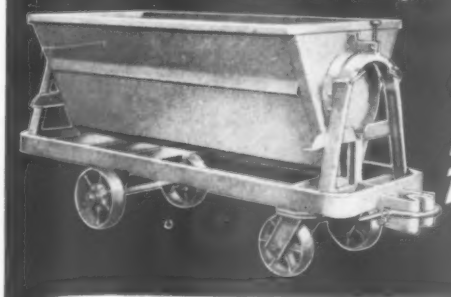
Building of the cars will be handled by 12 different shops, although the majority of the work will be done by American Car & Foundry Co., General American Tank Car Co., and Pullman-Standard Car Mfg. Co.

## Devises Trailer for Casting Storage

*Platform trailers built from discarded parts and equipped with heavy wooden wheels are employed by Cooper-Bessemer Corp., Mount Vernon, O., to relieve crowded conditions in its foundry. Trailers supplement use of old flat cars in removing large castings from the foundry for cooling or temporary storage, also to move castings between departments*




EWC Dump Body Trailers



INSURE FREE, CLEAN UNLOADING!

EWC Dump Trailers are available in capacities of ¾-yard, 1-yard, and 1½-yards—and are adaptable for handling any materials that can be dumped. The dumping operation is to either side, and the body is so balanced that it dumps almost without effort upon being unlocked. The extreme dumping angle assures complete unloading.

Let us help you plan your materials handling equipment. Write today for Bulletins, Prices, and suggestions.

EWC WHEELS

Electric Wheel Co., Dept. F, Quincy, Ill.

# WHERE-TO-BUY

**The following classified list of advertisers according to products is conducted for the convenience of our readers in quickly locating sources of all types of foundry equipment and supplies. If you are seeking information on any product not listed in this directory, a letter or post card addressed to THE FOUNDRY, Penton Building, Cleveland, will bring you this information by return mail.**

**ABRASIVE (Bricks and Files)**
Abrasive Co., Div. of Simonds Saw & Steel Co., Tacony & Fraley Sts., Philadelphia, Pa.
Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., Niagara Falls, N. Y.
Chicago Wheel & Mfg. Co., Dept. FD, 1101 W. Monroe, Chicago, Ill.
Cortland Grinding Wheels Corp., Chester, Mass.
Macklin Co., Jackson, Mich.
Norton Co., Worcester, Mass.
Safety Grinding Wheel & Mach. Co., Springfield, O.
Simonds Worden White Co., Dayton, O.
Sterling Grinding Wheel Co., Tiffin, O.

**ABRASIVE CLOTH and PAPER**
Behr-Manning Div. of Norton Co., Worcester, Mass.
Carborundum Co., Niagara Falls, N. Y.

**ABRASIVE (Metallic)—See SHOT and GRIT**

**ABRASIVE WHEELS**
Abrasive Co., Div. of Simonds Saw & Steel Co., Tacony & Fraley Sts., Philadelphia, Pa.
Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., Niagara Falls, N. Y.
Chicago Wheel & Mfg. Co., Dept. FD, 1101 W. Monroe, Chicago, Ill.
Cortland Grinding Wheels Corp. Chester, Mass.
Electro Refractories & Alloys Corp., 62 Andrews Bldg., Buffalo, N. Y.
Macklin Company, Jackson, Mich.
Manhattan Rubber Mfg. Div. of Raybestos, Manhattan, Inc., 77 Townsend St., Passaic, N. J.
Norton Company, Worcester, Mass.
Safety Grinding Wheel & Mach. Co., Springfield, O.
Simonds Worden White Co., Dayton, O.
Sterling Grinding Wheel Co., Tiffin, O.
West Co., Inc., 1117 Shackamaxon St., Philadelphia, Pa.

**ABRASIVE CUTOFF MACHINES**
Tabor Mfg. Co., 6225 Tacony St., Philadelphia, Pa.
Tannewitz Works, Grand Rapids, Mich.

**ACETYLENE GENERATORS**
Sight Feed Generator Co., Richmond, Ind.

**AFTERCOOLERS (Compressed Air)**
Johnson Corporation, Three Rivers, Mich.

**AIR COMPRESSORS**
Campbell-Hausfeld Co., Harrison, O.
Chicago Pneumatic Tool Co., General Offices: 8 East 44th St., New York.
Curtis Pneumatic Machinery Co., 1922 Kienlen Ave., St. Louis, Mo.
Fuller Company, Catasaqua, Pa.
Gardner-Denver Co., Gardner Drive, Quincy, Ill.
Ingersoll-Rand Co., 11 Broadway, New York, N. Y.
Schramm Inc., 800 N. Garfield Ave., West Chester, Pa.
Sullivan Machinery Co., Michigan City, Ind.
Worthington Pump & Machinery Corp., Harrison, N. J.

**AIR CONDITIONING EQUIPMENT**
American Air Filter Co., Inc., 266 Central Ave., Louisville, Ky.
American Foundry Equipment Co. 505 S. Byrkit St., Mishawaka, Ind.
Claude B. Schneible Co., 3953 Lawrence Ave., Chicago, Ill.
Curtis Pneumatic Machinery Co., 1922 Kienlen Ave., St. Louis, Mo.
Parsons Engineering Corp., Cleveland, O.
Ross, J. O., Engineering Corp., 350 Madison Ave., New York
B. F. Sturtevant Co., Hyde Park, Boston, Mass.

**AIR CONTROL EQUIPMENT**
Air-Way Pump & Equipment Co., 405 S. Jefferson St., Chicago, Ill.
American Air Filter Co., 266 Central Ave., Louisville, Ky.
Foxboro Co., Foxboro, Mass.
Jas. A. Murphy & Co., Hamilton, Ohio.
Ross, J. O., Engineering Corp., 350 Madison Ave., New York

**AIRLESS BLAST CLEANING EQUIPMENT**
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland, O.

**ALLOYS**
American-British Chemical Inc., 180 Madison Ave., New York.
American Smelting & Refining Co., 120 Broadway, New York
Climax Molybdenum Co., 500 Fifth Ave., New York, N. Y.
Electro Refractories & Alloys Corp., 62 Andrews Bldg., Buffalo, N. Y.
Globe Iron Co., Jackson, Ohio.
International Nickel Co. Inc., 67 Wall St., New York City.
Niagara Falls Smelting & Refining Corp., 2204 Elmwood Ave., Buffalo, N. Y.
Molybdenum Corporation of America, Pittsburgh, Pa.
Ohio Ferro-Alloys Corp., Canton, O

**ALLOYS (Ferro)**
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York, N. Y.
Hickman-Williams & Co., Union Trust Bldg., Cleveland, O.

**ALUMINUM INGOTS**
Bohn Aluminum & Brass Corp., 1400 Lafayette Bldg., Detroit, Mich.

**ANNEALING FURNACES (Electric)**
General Electric Co., Schenectady, N. Y.

**ANNEALING POT RAPPERS**
New Haven Vibrator Co., 131 Chestnut St., New Haven, Conn

**APPRAISALS & SURVEYS**
Walter Giele Co., First Natnl. Bank Bldg., Lebanon, Pa.

**AREATORS**
C. O. Bartlett & Snow Co., 6201 Harvard Ave., Cleveland, O.

**ARRESTORS (Dust)**
American Foundry Equipment Co., 505 Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Parsons Engineering Corp., Cleveland, O.

**ASSOCIATIONS**
Crucible Manufacturers Association, 90 West street, New York, N. Y.

**AXLES**
Electric Wheel Co., Quincy, Ill.

**BADGES (Identification)**
St. Louis Button Co., 415 Lucas Ave., St. Louis, Mo.

**BANDS (Snap Flask)**
Adams Co., 700 Foster St., Dubuque, Ia.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland, O.

**BAND SAWS (High Speed)**
Tannewitz Works, Grand Rapids, Mich.

**BAND SAWS (Variable Speed)**
Tannewitz Works, Grand Rapids, Mich.

**BARS (Steel)**
Bethlehem Steel Co., Bethlehem, Pa.
Republic Steel Corp., Cleveland, O.

**BATTERIES (Storage, Flashlight)**
Ideal Commutator Dresser Co., Sycamore, Ill.

**BEARINGS (Anti-Friction, Roller and Ball)**
Link Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.

**BELTING (Conveyor, Elevator)**
Imperial Belting Co., 1800 So. Kilbourn Ave., Chicago, Ill.

**BELTS (Power Transmission)**
Imperial Belting Co., 1800 So. Kilbourn Ave., Chicago, Ill.

**BENTONITE**
American Colloid Co., 363 W. Superior St., Chicago, Ill.
Eastern Clay Products, Inc., Eifort, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland, O.
Great Lakes Foundry Sand Co., United Artists Bldg., Detroit, Mich.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis St., Philadelphia, Pa.
F. E. Schundler & Co. Inc., 320 Railroad Ave., Joliet, Ill.

**BINS (Storage)**
American Bridge Co., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Neff & Fry, Camden, O.
Erie Steel Construction Co., Erie, Pa.

**BLACKING (Mold, Core)**
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland, O.
Frederic B. Stevens, Inc., Detroit, Mich.
J. S. McCormick Co., 25th St. & A. V. R. R., Pittsburgh, Pa.
United States Graphite Co., Saginaw, Mich.

**BLASTING EQUIPMENT**
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
American Steel Abrasives Co., Galion, O.
Dreisbach Engineering Corp., 45 Warburton Ave., Yonkers, N.Y.
Hydro-Blast Corp., 2350 N. Western Ave., Chicago, Ill.
Pangborn Corp., Hagerstown, Md.
Parsons Engineering Corp., Cleveland, O.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland, O.

**BLAST METERS**
Foxboro Co., Foxboro, Mass.

**BLOWERS**
American Air Filter Co., 266 Central Ave., Louisville, Ky.
American Foundry Equipment Co., 506 S. Byrkit St., Mishawaka, Ind.
Campbell-Hausfeld Co., Harrison, O.
Fisher Furnace Co. 5535 N. Wolcott Ave., Chicago, Ill.
General Blower Co., 406 N. Peoria St., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York, N. Y.
Mahr Manufacturing Co., Div. Diamond Iron Works Inc., Dept. F-10, Minneapolis, Minn.
North American Mfg. Co., 2910 E. 75th St., Cleveland, O.
Roots-Connersville Blower Corp., 302 Madison Ave., Connersville, Ind
Stroman Furnace & Engineering Co., Div. of Peterson Oven Co. 300 W. Adams St., Chicago, Ill.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.

**BOLTS AND NUTS**
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Republic Steel Corp., Cleveland, O.

**BOND CLAY**
American Colloid Co., 363 W. Superior St., Chicago, Ill.
Eastern Clay Products Inc., Eifort, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland, O.
Great Lakes Foundry Sand Co., United Artists Bldg., Detroit, Mich.
Ironton Fire Brick Co., Ironton, O.
Lawrence Clay Co., Jackson, O.
F. E. Schundler & Co. Inc., 320 Railroad Ave., Joliet, Ill.

**BOOKS (Technical)**
Penton Publishing Co., 1213 West 3rd St., Cleveland, O.

**BOTTOM PLATES AND BOARDS**
Adams Co., 700 Foster St., Dubuque, Iowa.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.

**BOTTOM PLATES AND BOARDS (Cont'd.)**
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee, Wis.
Wadsworth Core Machine & Equip. Co., Akron, O.

**BOWLS and SHANKS**
Industrial Equipment Co., Minster, O.

**BOXES (Tote)**
Penn Iron Works, Reading, Pa.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee, Wis.

**BRAKES (Magnetic)**
Stearns Magnetic Mfg. Co. 662 S. 28th St. Milwaukee, Wis.
Carborundum Co., Niagara Falls, N. Y.
Haws Refractories Co., Johnstown, Pa.
Norton Co., Worcester, Mass.

**BRICK (Refractory)**
Carborundum Co., Niagara Falls, N. Y.
Haws Refractories Co. Johnstown, Pa.
Ironton Fire Brick Co., Ironton, O.
Norton Co., Worcester, Mass
Ramtite Company, Div. of S. Obermayer Co., 1803 S. Rockwell St., Chicago, Ill.
Chas. Taylor Sons Co., Cincinnati, O.
Titanium Alloy Mfg. Co., Niagara Falls, N. Y.

**BRIQUETS (Alloy)**
Climax Molybdenum Co., 500 Fifth Ave., New York, N. Y.
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York, N. Y.

**BRIQUETS (Ferro Alloy)**
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York, N. Y.

**BRIQUETS (Silicon Carbide)**
Carborundum Co., Niagara Falls, N. Y.

**BRIQUETTING MACHINERY (Metal)**
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.

**BRUSHES**
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.

**BUCKETS (Elevating, Clam Shell, Drag Line, Grab, Loader, Dumping)**
Blaw-Knox Co., Farmers Bank Bldg.,
Eichfeld, Wm. F., & Sons Co., 2550 No. 30th St., Milwaukee, Wis.
Pittsburgh, Pa.
Erie Steel Construction Co., Erie, Pa.
National Engineering Co., 549 W. Washington St., Chicago, Ill.
Penn Iron Works, Reading, Pa.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

**BUILDING and ENGINEERING SERVICE**
American Bridge Co., Pittsburgh, Pa.

**BURNERS (Acetylene, Oil, Gas, Powdered Coal, Stoker)**
Fisher Furnace Co., 5535 N. Wolcott Ave., Chicago, Ill.
Hauck Mfg. Co., 106 Tenth St., Brooklyn, N. Y.
North American Mfg. Co. 2910 E. 75th St., Cleveland, O.
Surface Combustion Co., Toledo, O.

**BUSHINGS (Flask-Pin)**
Hines Mfg. Co. 1324 Hird Ave., Cleveland, O.
C. M. Smillie & Co., 1100 Woodward Hgts. Blvd., Ferndale, Mich.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee, Wis.

**CALCIUM MOLYBDATE**
Climax Molybdenum Co., 500 Fifth Ave., New York, N. Y.
Molybdenum Corporation of America, Pittsburgh, Pa.

**CALCIUM BORIDE**
Electro Refractories & Alloys Corp., 62 Andrews Bldg., Buffalo, N. Y.
Molybdenum Corporation of America, Pittsburgh, Pa.

**CASSETTES (X-Ray Film)**
Picker X-Ray Corp., 300 Fourth Ave., New York City.

*—When writing advertisers, please mention* THE FOUNDRY—

# SAVE WHILE YOU PRODUCE

*with* FEDERAL PRODUCTS

**FEDERAL CLIMAX WIRE STRAIGHTENERS**

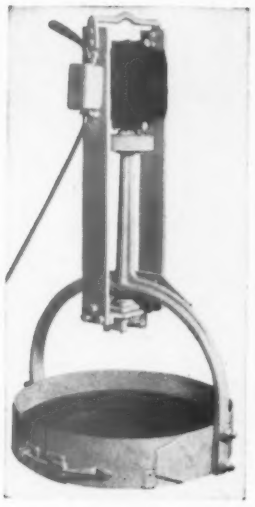
● Any foundry, large or small, can cut production costs by straightening and re-using core wires and rods. With a Climax Wire Straightener this can be done quickly, economically, safely—by unskilled labor. A complete descriptive circular is yours for the asking.

**FEDERAL CORE-JARRING MACHINES**

● Eliminate hand ramming and get uniformly rammed cores with Federal Core Jarring Machines. Powered by air, these machines are sturdy and long wearing. Readily available *now* when you need them. The present lack of experienced labor will not handicap your shop if you have Federal Core Jarring Machines.

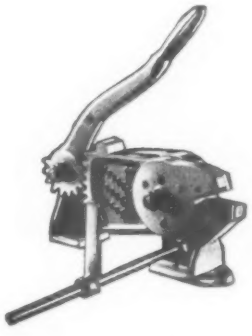
Made in four sizes, graded by size of table and capacity: No. 0, table 10″ x 10″, capacity 150 lbs.; No. 1, table 12″ x 12″, capacity 300 lbs.; No. 2, table 18″ x 18″, capacity 400 lbs. and No. 5, table 18″ x 20″, capacity 600 lbs.

Write for details and prices on these labor-savers today.



**FEDERAL LOWE ELECTRIC SIFTER**

● Faster sifting, better sand conditioning combine to cut costs when a Lowe is on the job. Malleable yoke creates faster sifting; more shovel clearance permits faster loading. Enclosed ball bearing motor is a miser on current. Instantly replaceable screen bottoms. Lowe-sifted sand is better sand.



**FEDERAL WONDER CUTTER**

● Users say it's worth its weight in gold. Small enough to be mounted on any bench or table, the Wonder Cutter will cut round or square rods and band iron. Priced at $39.50 f.o.b. Cleveland—every foundry should own one.

*"The Twist Does The Trick"*

**FEDERAL TWISTED STEM CHAPLETS**

● The chaplet with everything. The *Twisted Stem* promotes rapid complete fusion. Not deformed, the stem has no weak spot to burn in and permit core shift. Made in a complete range of sizes. Samples of the size you use, gladly submitted.

## THE FEDERAL FOUNDRY SUPPLY CO.

**4600 EAST 71st STREET, CLEVELAND, OHIO**

CHICAGO — CHATTANOOGA, TENN. — CROWN HILL, W. VA. — DETROIT — MILWAUKEE
MINNEAPOLIS — NEW YORK — RICHMOND, VA. — ST. LOUIS — UPTON, WYO.

Chamberlain Co., Los Angeles, Calif.—Pacific Graphite Wks., Oakland, Calif.—LaGrand Industrial Supply Co., Portland, Ore.—Shanahan's Ltd., Vancouver, B. C.

# J & C AUTOCLAVE

IMPREGNATING SYSTEMS FOR MAGNESIUM CASTINGS, ETC.

**Pioneers in the design and manufacture of Autoclave equipment, the Jackson & Church Co. is fully equipped to lay out and build any and all types of impregnating systems. The tank shown here is equipped for either steam or electrical heating and is enclosed in an insulating jacket. Regardless of the materials you wish to impregnate—magnesium castings, aluminum parts, wood, etc.—it will pay you to call in the Jackson & Church experienced engineers.**

JACKSON & CHURCH CO. • SAGINAW, MICHIGAN


## WHERE-TO-BUY

**CASTINGS**
Acme Pattern & Tool Co., Inc., 232 N. Findlay St., Dayton, O.
City Pattern Foundry & Machine Co., 1165 Harper Ave., Detroit, Mich.

**CASTING PLASTER**
National Gypsum Co., Buffalo, N. Y.
United States Gypsum Co., 300 W. Adams St., Chicago, Ill.

**CASTING SEALER & IMPREGNATING**
Empire Varnish Co., 2636 E. 76th St., Cleveland, O.

**CEMENT (Metallic)**
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland, O.
Frederic B. Stevens, Inc., Detroit, Mich.
Smooth-On Manufacturing Co., 570 Communipaw Ave., Jersey City, N. J.

**CEMENT (Refractory)**
Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., Niagara Falls, N. Y.
Electro Refractories & Alloys Corp., 62 Andrews Bldg., Buffalo, N. Y.
Fisher Furnace Co. 5535 N. Wolcott Ave., Chicago, Ill.
Ironton Fire Brick Co., Ironton, O.
Norton Co., Worcester, Mass.
Ramtite Company, Div. of S. Obermayer Co., 1803 S. Rockwell St., Chicago, Ill.
Chas. Taylor Sons Co., Cincinnati, O.
Titanium Alloy Mfg. Co., Niagara Falls, N. Y.

**CHAIN (Hoist, Conveyor, Drive, Sling, etc.)**
Link Belt Co., 300 W. Pershing Rd. Chicago, Ill.

**CHAPLETS**
Cleveland Chaplet & Mfg. Co., 1197 West 67th St., Cleveland, O.
Combined Supply & Equipment Co. Inc., 215 Chandler St., Buffalo, N. Y.
Fanner Mfg. Co., Brookside Park, Cleveland, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland, O.
Freeman Supply Co., 1152 Broadway Toledo, Ohio.
Milwaukee Chaplet & Mfg. Co., 1023 So. 40th St., Milwaukee, Wis.
One Piece Chaplet Co., 4001 Ashland Philadelphia, Pa.
Frederic B. Stevens, Inc., Detroit, Mich.

**CHEMICALS**
American-British Chemical Inc., 180 Madison Ave., New York.
Hercules Powder Co., 999 Market St., Wilmington, Del.
Jobbins, Wm. F., Co., Aurora, Ill.
The Mathieson Alkali Works, Inc., 60 E. 42nd St., New York, N. Y.

**CHEMISTS**
Chas. C. Kawin Co., 431 So. Dearborn St., Chicago, Ill.

**CHILLS**
Alloy Metal Abrasive Co., 311 W. Huron St., Ann Arbor, Mich.
Chicago Chaplet Co., 2047 N. Wood St., Chicago, Ill.
Fanner Mfg. Co., Brookside Park, Cleveland, O.
Milwaukee Chaplet & Mfg. Co., 1023 So. 40th St., Milwaukee, Wis.

**CHILL COATINGS**
Dayton Oil Co., Dayton, O.

**CHILL NAILS**
Capewell Mfg. Co., Hartford, Conn.
Standard Horse Nail Corp., New Brighton, Pa.

**CHILL OILS**
Certified Core Oil & Mfg. Co., 3308 So. Cicero Ave., Chicago, Ill.

**CHIPPERS—See PNEUMATIC TOOLS**

**CHILL COILS**
Fanner Mfg. Co., Brookside Park, Cleveland, O.
J. S. McCormick Co., 25th St. & A.V.R.R. Pittsburgh, Pa.

**CHROMIUM (Briquets)**
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York, N. Y.

**CINDER MILLS**
Dreisbach Engineering Corp., 45 Warburton Ave., Yonkers, N. Y.

**CLAMPS (Flask)**
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland, O.

**CLAMPS (Flask) (Cont'd.)**
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh, Pa.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee, Wis.

**CLAY (Bonding)**
American Colloid Co., 363 W. Superior St., Chicago, Ill.
Eastern Clay Products, Inc., Elfort, O.
The Federal Foundry Supply Co., 4600 E. 71st St., Cleveland, O.
Illinois Clay Products Co., Joliet, Ill.
Ironton Fire Brick Co., Ironton, O.
The Lawrence Clay Co., Jackson, O.
F. E. Schundler & Co. Inc., 320 Railroad Ave., Joliet, Ill.

**CLAY STORAGE BINS**
Neff & Fry, Camden, O.

**CLEANING COMPOUNDS (Window, etc.)**
Hercules Powder Co., 999 Market St., Wilmington, Del.

**CLEANING EQUIPMENT (Castings)**
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
N. Ransohoff Inc., 208 W. 71st St., Cincinnati, O.

**CLUTCHES (Magnetic)**
Stearns Magnetic Mfg. Co., 622 S. 28th St., Milwaukee, Wis.
Dings Magnetic Separator Co., 512 E. Smith St., Milwaukee, Wis.

**COAL STORAGE BINS**
Neff & Fry, Camden, O.

**COKE (Foundry)**
Hickman-Williams & Co., Cleveland, O.
Pickands, Mather & Co., Cleveland, O.
Republic Coal & Coke Co., 8 So. Michigan Ave., Chicago, Ill.

**COLLECTORS (Dust)**
American Air Filter Co. 266 Central Ave., Louisville, Ky.
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Buell Engineering Co., 14 Cedar St., New York City.
Newcomb-Detroit Co. Inc., 5751 Russell St., Detroit, Mich.
R. C. Mahon Co., 8650 Mt. Elliot Ave., Detroit, Mich.
Pangborn Corp., Hagerstown, Md.
Parsons Engineering Corp., Cleveland, O.
Peters-Dalton Inc., 628 E. Forest Ave., Detroit, Mich.
Claude B. Schneible Co., 3953 Lawrence Ave., Chicago, Ill.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland, O.

**COMBUSTION EQUIPMENT**
North American Mfg. Co., 2910 E. 75th St., Cleveland, O.

**CONCRETE STORAGE BINS**
Neff & Fry Co., Camden, O.

**CONTROL SYSTEMS (Dust)**
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
American Air Filter Co., 223 Central Ave., Louisville, Ky.
Buell Engineering Co., 14 Cedar St., New York City.
Pangborn Corp., Hagerstown, Md.
Parsons Engineering Corp., Cleveland, O.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland, O.

**CONVERTERS (Bessemer)**
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

**CONVERTER BLOWERS**
Roots-Connersville Blower Corp., 302 Madison Ave., Connersville, Ind.

**CONVEYORS Belt)**
Beardsley & Piper Co., The 2541 N. Keeler Ave., Chicago, Ill.
C. O. Bartlett & Snow Co., 6201 Harvard Ave., Cleveland, O.
Imperial Belting Co., 1800 So. Kilbourn Ave., Chicago, Ill.
Link Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Mahr Mfg. Co., Minneapolis, Minn.
The Manhattan Rubber Mfg. Passaic, N. J.
Robins Conveyors Inc., Passaic, N. J.
Standard Conveyor Co., North St. Paul, Minn.

**CONVEYORS (Chain)**
Link Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
Standard Conveyor Co., North St. Paul, Minn.

*—When writing advertisers, please mention* THE FOUNDRY—

## WHERE-TO-BUY

**CONVEYORS (Gravity)**
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
Standard Conveyor Co., North St. Paul, Minn.

**CONVEYORS (Live Roller)**
Standard Conveyor Co., North St. Paul, Minn.

**CONVEYORS (Magnetic)**
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee, Wis.

**CONVEYORS (Monorail)**
American Monorail Co., 13104 Athens Ave., Cleveland, O.
Chicago Tramrail Co., 2910 Carroll Ave., Chicago, Ill.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1153 East 283rd St., Wickliffe, O.
Link Belt Co., 300 W. Pershing Rd., Chicago, Ill
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
Penn Iron Works, Reading, Pa.

**CONVEYORS (Pneumatic)**
Fuller Company, Catasaqua, Pa.

**CONVEYORS (Rubber)**
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.
Standard Conveyor Co., North St. Paul, Minn.

**CONVEYORS (Vibrating)**
Ajax Flexible Coupling Co., Westfield, N. Y.
Syntron Company, Homer City, Pa.

**COPPER**
American Smelting & Refining Co., 120 Broadway, New York
River Smelting & Refining Co., 4195 Bradley, Cleveland, O.

**COPPER SHOT**
Alloy Metal Abrasive Co., 311 W. Huron St., Ann Arbor, Mich
American Smelting & Refining Co., 120 Broadway, New York
Niagara Falls Smelting & Refining Corp., 2204 Elmwood Ave., Buffalo, N. Y.

**CORE BINDERS**
American Gum Products Co., 500 Fifth Ave., New York, N. Y.
Certified Core Oil & Mfg. Co., 3308 So. Cicero Ave., Chicago, Ill.
Cities Service Oil Co., 3200 S. Western Ave., Chicago, Ill.
Corn Products Sales Co., 17 Battery Pl., New York City.
Dayton Oil Co., Dayton, O.
Delta Oil Products Co., Milwaukee, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland, O.
Hercules Powder Co., 999 Market St., Wilmington, Del.
International Paper Co., 220 E. 42nd St., New York City.
J. S. McCormick Co., 25th St., & A.V.R.R., Pittsburgh, Pa.
Penola Inc., Pittsburgh, Pa.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia, Pa.
Robeson Process Co., 500 Fifth Ave., New York.
Swan-Finch Oil Corp., R.C.A. Bldg., West, New York.
Werner G. Smith Co., (Div. of Archer-Daniels-Midland Co.), 2191 W. 110th St., Cleveland, O.
Frederic B. Stevens, Inc., Detroit, Mich.
United Oil Mfg. Co., 1429 Walnut St., Erie, Pa.
Velsicol Corp., 120 E. Pearson St., Chicago, Ill.

**CORE BLOWING MACHINES**
Champion Foundry & Machine Co., 1314 West 21st St., Chicago, Ill.
Wm. Demmler & Bros., Kewanee, Ill
International Molding Machine Co., 2608 W. 16th St., Chicago, Ill.
Wm. H. Nicholls Co., Richmond Hill, Long Island, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.

**CORE BREAKERS**
Cleveland Pneumatic Tool Co., 3781 East 77th St., Cleveland, O.

**CORE COMPOUND**
Certified Core Oil & Mfg. Co., 3308 So. Cicero Ave., Chicago, Ill.
Cities Service Oil Co., 3200 S. Western Ave., Chicago, Ill.
Dayton Oil Co., Dayton, Ohio.
Delta Oil Products Co., Milwaukee, Wis.
The Federal Foundry Supply Co., 4600 E. 71st St., Cleveland, O.

**CORE COMPOUND (Cont'd.)**
International Paper Co., 220 E. 42nd St., New York City.
The Werner G. Smith Co., (Div. of Archer-Daniels-Midland Co.), 2191 W. 110th St., Cleveland, O.
J. S. McCormick Co., 25th St. & A.V.R.R., Pittsburgh, Pa.
Penola Inc., Pittsburgh, Pa.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia, Pa.
Smith Facing & Supply Co., 1857 Carter Rd., Cleveland, O.
Frederic B. Stevens, Inc., Detroit, Mich.
Swan-Finch Oil Corp., R.C.A. Bldg., West, New York.
Velsicol Corp., 120 E. Pearson St., Chicago, Ill.
E. J. Woodison Co., 7515 St. Aubin Ave., Detroit, Mich.

**CORE CUTTING AND CONING MACHINES**
Wadsworth Core Machine & Equip. Co., Akron, O.

**CORE DRAWER**
Freeman Supply Co., Toledo, O.

**CORE GRINDERS (Power Operated)**
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.

**CORE KNOCKOUT MACHINES**
Beardsley & Piper Co., The, 2541 N. Keeler Ave., Chicago, Ill.
Hydro-Blast Corp. 2550 N. Western Ave., Chicago, Ill.
Pangborn Corp., Hagerstown, Md.
Simplicity Engineering Co., Durand, Mich.

**CORE MAKING MACHINES**
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Wm. Demmler & Bros., Kewanee, Ill.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh, Pa.
International Molding Machine Co., 2608 W. 16th St., Chicago, Ill.
Milwaukee Foundry Equipment Co., 3228 W. Pierce St., Milwaukee, Wis.
Wadsworth Core Machine & Equip. Co., Akron, O.

**CORE OIL**
Apex Motor Fuel Co., 1401 W. North Ave., Chicago, Ill.
Buckeye Products Co., 7022 Vine St., Cincinnati, O.
Certified Core Oil & Mfg. Co., 3308 So. Cicero Ave., Chicago, Ill.
Cities Service Oil Co., 3200 S. Western Ave., Chicago, Ill.
Dayton Oil Co., Dayton, O.
Delta Oil Products Co., Milwaukee, Wis.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia, Pa.
Werner G. Smith Co., (Div. of Archer-Daniels-Midland Co.), 2191 W. 110th St., Cleveland, O.
Frederic B. Stevens, Inc., Detroit, Mich.
Penola Inc., Pittsburgh, Pa.
Swan-Finch Oil Corp., R.C.A. Bldg., West, New York.
Tiona Petroleum Co., Widener Bldg., Philadelphia, Pa.
United Oil Mfg. Co., 1429 Walnut St., Erie, Pa.
Velsicol Corp., 120 E. Pearson St., Chicago, Ill.
E. J. Woodison Co., 7515 St. Aubin Ave., Detroit, Mich.

**CORE OVENS**
G. S. Blodgett Co. Inc., Burlington, Vt.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland, O.
Despatch Oven Co., Minneapolis, Minn.
Foundry Equipment Co., Cleveland, O.
Haynes Foundry Equipt Co., 1734 Lake St., Kalamazoo, Mich.
Lanly Company, 750 Prospect Ave., Cleveland, O.
Maehler, Paul, Co., 2200 W. Lake St., Chicago, Ill.
Mahr Mfg. Co., Div. of Diamond Iron Works Inc., Dept. F8. Minneapolis, Minn.
R. C. Mahon Co., 8650 Mt. Elliott Ave., Detroit, Mich.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia, Pa.

*—When writing advertisers, please mention* THE FOUNDRY—

# How SMOOTH-ON saves good castings from the scrap heap

A poor casting, seriously flawed, weakened, unsound, *belongs* on the scrap heap. But a sound, strong casting, whose only fault is a few slight, but displeasing surface blemishes, sand holes, blow holes, contour irregularities, should most surely be spared the danger of rejection.

Give all your castings good looks that reflect credit on you, by correcting unimportant but unsightly surface blemishes with Smooth-On No. 4 Foundry Cement, as done by leading foundrymen for nearly half a century.

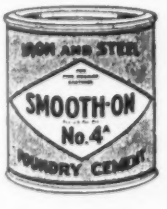
Smooth-On is inexpensive, easy to apply. You use it like putty, and it hardens with a dense texture and color that matches the casting. Three types:

**Smooth-On No. 4AA.** For light gray castings and machined surfaces. Has high metallic lustre and takes a fine machine finish.

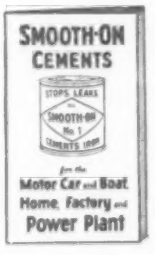
**Smooth-On No. 4A.** For medium gray castings. A fine-grained cement that has a good metallic lustre.

**Smooth-On No. 4B.** For dark gray castings. A cement of coarser grain and darker shade.

*Smooth-On No. 4AA is packed in 1-lb. can, 10-lb. and 50-lb. kegs. Smooth-On Nos. 4A and 4B are packed in 1-lb. and 5-lb. can, 25-lb. pail or 100-lb. keg. For your protection, insist on Smooth-On, used by foundrymen since 1895.*




**FREE** Hardened and Working Samples *also* The Smooth-On Repair Handbook
40 Pages 170 Diagrams




Smooth-On Mfg. Co., Dept. 17,
570 Communipaw Ave., Jersey City 4, N. J.

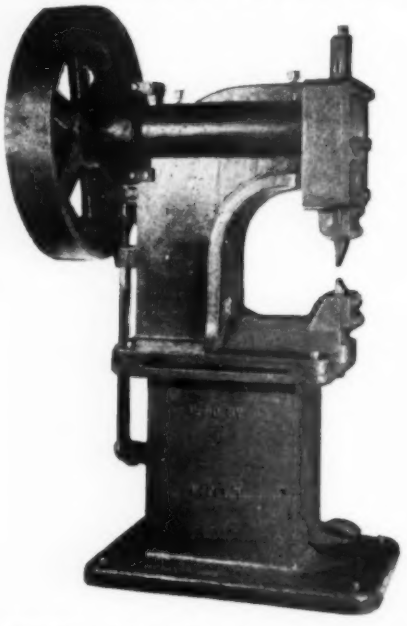
Send Smooth-On Handbook.
Send samples of ☐ Smooth-On No. 4AA ☐ Smooth-On No. 4A ☐ Smooth-On No. 4B

Name .....
Address .....
9-43 .....

*Do it with* **SMOOTH-ON**

# SPRUE CUTTERS ★ NEW!

## for IMMEDIATE DELIVERY



**2 SIZES**

**MODEL "H"**
capacity 3/4" sq common brass
9" depth of throat
Height O/A 5'3"
Weight 1025 lbs.

●

**MODEL "I"**
capacity 1-1/4" sq common brass
13" depth of throat
Height O/A 6 ft.
Weight 2400 lbs.

●

*Write, Wire or Phone*
**PROspect 8770**

**Scully Machinery & Equipment Corp.**
(Formerly—Fdy. Division Scully-Jones & Co.)
NEW *Warehouse nd Office* ➡ **2031 West 74th Street Chicago, Illinois**



# SPEED UP YOUR CORE BAKING!

## BLODGETT "B&M" Industrial OVEN

These practical, versatile, rugged ovens are helping cut production time in core-baking, heat treating, enamelling and a host of other processes in plants all over the country.

Low in price and promptly delivered, the Blodgett "B & M" industrial ovens offer these features; Shelf loading · Compact · Strap iron or solid shelves, spaced to provide clearances desired · Center-opening swing doors · Removable shelves · Shelf fittings to specification · Sturdy construction · 3" Fiberglas insulation · Automatic control on gas-fired model · Three standard sizes.

Write Today for Descriptive Literature.

**The G. S. BLODGETT CO., Inc.** Burlington Vermont


# WHERE-TO-BUY

**CORE OVENS (Cont'd.)**
Porbeck Mfg. Co., 2600 N. 9th St., St. Louis, Mo.
Ross, J. O., Engineering Corp., 350 Madison Ave., New York
Vulcan Corporation, 18th & Cherry Sts., Philadelphia, Pa.
Young Brothers Co., 6508 Mack Ave., Detroit, Mich.

**CORE PASTE**
Corn Products Sales Co. 17 Battery Pl., New York City.
Dayton Oil Co., Dayton, O.
Delta Oil Products Co., Milwaukee, Wis.
Eastern Clay Products, Inc., Elfort, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland, O.
J. S. McCormick Co., 25th St. & A.V.R.R., Pittsburgh, Pa.

**CORE PLATES**
Wadsworth Core Machine & Equip. Co., Akron, O.

**CORE PLATES (Steel Asbestos)**
Diamond Clamp & Flask Co., Richmond, Ind.
Johns-Manville, 22 East 40th St., New York City.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee, Wis.

**CORE RODS**
Bethlehem Steel Co., Bethlehem, Pa.

**CORE ROD STRAIGHTENING and CUTTING MACHINERY**
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.

**CORE SAND**
Great Lakes Foundry Sand Co., United Artists Bldg., Detroit, Mich.
Ottawa Silica Co., Ottawa, Ill.
Titanium Alloy Mfg. Co., Niagara Falls, N. Y.

**CORE SAND MIXERS**
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Beardsley & Piper Co., The, 2541 N. Keeler Ave., Chicago, Ill.
Clearfield Machine Co., Clearfield, Pa.
Construction Machinery Corp., Waterloo, Iowa
National Engineering Co., 549 W. Washington St., Chicago, Ill.
Royer Foundry & Machine Co., Kingston, Pa.

**CORE SPRAYERS**
Freeman Supply Co., 1152 Broadway Toledo, Ohio.

**CORE TRUCKS**
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago, Ill.
Eichfeld, Wm. F., & Sons Co., 2550 No. 30th St., Milwaukee, Wis.

**CORE VENTS**
Champion Foundry and Machine Co., 1314 W. 21st St., Chicago, Ill.
Wm. Demmier & Bros., Kewanee, Ill.
C. M. Smillie & Co., 1100 Woodward Hgts. Blvd., Ferndale, Mich.
United Compound Co., Inc., 328 South Park Ave., Buffalo, N. Y.

**CORE WASH**
Carborundum Co., Niagara Falls, N. Y.
Cities Service Oil Co., 3200 S. Western Ave., Chicago, Ill.
Corn Products Sales Co., 17 Battery Pl., New York City.
Dayton Oil Co., Dayton, O.
Delta Oil Products Co., Milwaukee, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland, O.
Foundry Services Inc., 280 Madison Ave., New York, N. Y.
J. S. McCormick Co., 25th St. & A.V.R.R., Pittsburgh, Pa.
Penola Inc., Pittsburgh, Pa.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia, Pa.
Pollard Oil Products Co., 1627 So. 44th St. Milwaukee, Wis.
Smith Facing & Supply Co., 1857 Carter Rd., Cleveland, O.
Frederic B. Stevens, Inc., Detroit, Mich.

**CORE WASH (Cont'd.)**
Titanium Alloy Mfg. Co., Niagara Falls, N. Y.
United Oil Mfg. Co., 1429 Walnut St., Erie, Pa.
United States Graphite Co. Saginaw, Mich.

**CORE WIRE CUTTERS**
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland, O.

**CORE WIRE STRAIGHTENERS**
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland, O.

**COUPLINGS (Flexible)**
Ajax Flexible Coupling Co., Westfield, N. Y.

**CRANES (Bucket)**
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

**CRANE CONTROL (Electric)**
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

**CRANE LUBRICATING SYSTEMS**
Blaw-Knox Co., Farmers Bank Bldg., Pittsburgh, Pa.

**CRANES (Electric Traveling)**
American MonoRail Co., 13104 Athens Ave., Cleveland, O.
Cleveland Tramrail Div., of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Conco Engineering Works, Mendota, Ill.
Erie Steel Construction Co., Erie, Pa.
Reading Chain & Block Corp., 2108 Adams St., Reading, Pa.
Shepard-Niles Crane & Hoist Corp., 360 Schuyler Ave., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

**CRANES (Gantry)**
Modern Equipment Co., Dept. 199, Port Washington, Wis.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

**CRANES (Hand Travelling)**
American MonoRail Co., 13104 Athens Ave., Cleveland, O.
Chicago Tramrail Co., 2910 Carroll Ave., Chicago, Ill.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Modern Equipment Co., Dept. 199, Port Washington, Wis.
Reading Chain & Block Corp., 2108 Adams St., Reading, Pa.
Shepard-Niles Crane & Hoist Corp., 360 Schuyler Ave., Montour Falls, N. Y.
Whiting Corp. 15607 Lathrop Ave., Harvey, Ill.

**CRANES (Jib)**
American MonoRail Co., 13104 Athens Ave., Cleveland, O.
Chicago Tramrail Co., 2910 Carroll Ave., Chicago, Ill.
Eichfeld, Wm. F., & Sons Co., 2550 No. 30th St., Milwaukee, Wis.
Modern Equipment Co., Dept. 199, Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

**CRANES (Monorail)**
American Engineering Co., 2418 Aramingo Street, Philadelphia, Pa.
American MonoRail Co., 13104 Athens Ave., Cleveland, O.
Chicago Tramrail Co., 2910 Carroll Ave., Chicago, Ill.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Conco Engineering Works, Mendota, Ill.
Shepard-Niles Crane & Hoist Corp., 360 Schuyler Ave., Montour Falls, N. Y.
Modern Equipment Co., Dept. 199, Port Washington, Wis.

**CRANES (Portable, Electric)**
Automatic Transportation Co., 121 West 87th St., Chicago, Ill.

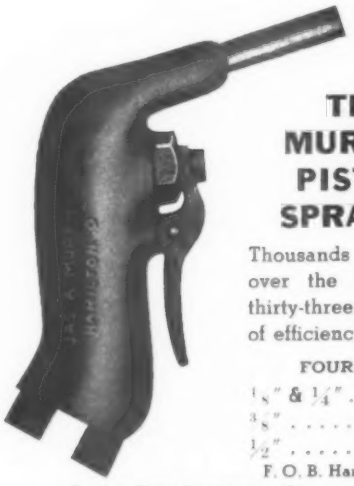
**CRUCIBLES**
American Crucible Co., Shelton, Conn.
Electro Refractories & Alloys Corp., 62 Andrews Bldg., Buffalo, N. Y.

# MURPHY SEPARATOR FILTERS

COMPLETE WATER ELIMINATION
FULLY AUTOMATIC

*Trouble Free Operation for Years*

Some core blowing machine manufacturers use the Type A as regular equipment. There are cases where 12 machines are operated from one large separator. Whether used for a single machine or for a battery they give 100 percent satisfaction. For Sand Blast purposes they have no equal



## THE MURPHY PISTOL SPRAYER

Thousands in use all over the world. A thirty-three year record of efficiency.

FOUR SIZES

1/8" & 1/4" . . . . $10.00
3/8" . . . . . $12.00
1/2" . . . . . $15.00

F. O. B. Hamilton, Ohio

Suction Hose & sinker regular equipment

*Literature on request*

## JAMES A. MURPHY & CO.

HAMILTON, OHIO

DRAIN TRAPS — AFTERCOOLERS — SEPARATOR FILTERS

*For* ACCURATE
LOW COST TESTING

★ Model 505 is the most accurate and reliable machine in the low priced bracket today.
★ Rubber mounted dial panel with inclination adjustable to suit sitting or standing position of the operator.
★ Extensometer — specimen — load indicator and speed control scale can be observed by one operator without changing position.
★ Two motor drives — one for hydraulic loading and a second one for fast vertical adjustment of gripping head and table.
★ Spherically suspended gripping head and table assuring consistent accuracy even with loads applied off-center.
★ Highest quality, high pressure piston pump for lifetime service and accurate speed control.
★ Testing speeds on large scale in inches per minute.
★ Capacities available include 10,000, 20,000, 30,000, 40,000 and 60,000 lbs. Popular sizes 40,000 and 60,000 lbs are stocked for delivery on short notice.

# RIEHLE
## TESTING MACHINES

*Division of American Machine and Metals, Inc*
EAST MOLINE, ILLINOIS

PROTECTION FOR CASTINGS!

It is now more vital than ever to avoid failure in core support because the consequent rejects and make-overs seriously impede the war effort.

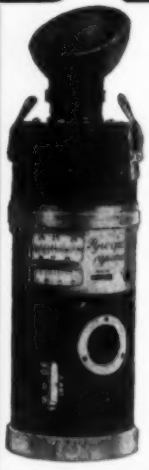
Cleveland Chaplets, made in Stem, Double-Head, Patented Coil Head and Square Head types, are the last word in dependability.

CLEVELAND CHAPLET & MFG. CO.
West 67th St. & N.Y.C. Ry.
CLEVELAND, OHIO

## CUPOLAS FOR SALE

TWO WHITING CUPOLAS. 114" Shell Diameter, complete from foundations to top of stacks, including movable hoods, but not charging machines. Already dismantled and ready to load. Price $3,000 — not loaded. Although purchased about 1921, they have been used very little.

THE SINGER MANUFACTURING CO.
ROOM 925 • 149 BROADWAY • NEW YORK 6, N. Y.



PYRO THE SIMPLIFIED OPTICAL PYROMETER

HERE'S A HOT ONE!

A 3 lb., self-contained, DIRECT-READING simplified optical pyrometer that gives the TRUE SPOUT AND POURING TEMPERATURES OF MOLTEN IRON AND STEEL MEASURED IN THE OPEN! That's what the PYRO does! No upkeep, no accessories—and it quickly pays for itself. Don't swear AT other pyrometers; get a PYRO and swear BY it. For NON-FERROUS foundry, use PYRO IMMERSION PYROMETER. Write for catalogs describing ranges and types.

THE PYROMETER INSTRUMENT CO.
Plant & Lab.:
106 Lafayette St., New York, N. Y.


## WHERE-TO-BUY

**CRUCIBLES (Cont'd.)**
Joseph Dixon Crucible Co., Jersey City, N. J.
Lava Crucible Co., Pittsburgh, Pa.
Ross-Tacony Crucible Co., Tacony, Philadelphia, Pa.
Vesuvius Crucible Co., Swissvale, Pa.

**CRUCIBLE FURNACES**
Campbell-Hausfeld Co., Harrison, O.
Fisher Furnace Co., 5525 N. Wolcott Ave., Chicago, Ill.

**CRUCIBLE LIFTERS**
Modern Equipment Co., Dept. 199, Port Washington Wis.

**CRUCIBLE POURING DEVICES**
Modern Equipment Co., Dept. 199, Port Washington, Wis.

**CUPOLAS**
Modern Equipment Co., Dept. 199, Port Washington, Wis.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia, Pa.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

**CUPOLA AIR CONDITIONING**
Surface Combustion Corp., Toledo, O.

**CUPOLA BLOWERS**
Roots-Connersville Blower Corp., 302 Madison Ave., Connersville, Ind.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

**CUPOLA CHARGING MACHINES**
American MonoRail Co., 13104 Athens Ave., Cleveland, O.
Modern Equipment Co., Dept. 199, Port Washington, Wis.
Shepard-Niles Crane & Hoist Corp., 360 Schuyler Ave., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

**CUPOLA CONTROL EQUIPMENT**
Edwin S. Carman, Lee Rd. at Mayfield, Cleveland, O.
Foxboro Co., Foxboro, Mass.

**CUPOLA DRY BLAST**
Surface Combustion Corp. Toledo, O.

**CUPOLA DUST ARRESTORS**
Claude B. Schneible Co., 3953 Lawrence Ave., Chicago, Ill.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

**CUPOLA LIGHTERS**
Cleveland Quarries Co., Cleveland, Ohio.
Hauck Mfg. Co., 106 Tenth St., Brooklyn, N. Y.

**CUPOLA LININGS**
Carborundum Co., Niagara Falls, N. Y.
Haws Refractories Co., Johnstown, Pa.
Ironton Fire Brick Co., Ironton, O.
Ramtite Company, Div. of S. Obermayer Co., 1803 S. Rockwell St., Chicago, Ill.
Chas. Taylor Sons Co., Cincinnati, O.
United States Graphite Co., Saginaw, Mich.

**CUPOLA SPARK ARRESTORS**
Whiting Corp., 15607 Lathrop Ave., Chicago, Ill.

**CUTOFF MACHINES (Abrasive)**
Fox Grinders Inc., Oliver Bldg., Pittsburgh, Pa.,
Tabor Mfg. Co., 6225 Tacony St., Philadelphia, Pa.

**CUTTING OILS**
Penola Inc., Pittsburgh, Pa.

**DARK ROOM ACCESSORIES (X-Ray)**
Picker X-Ray Corp., 300 Fourth Ave., New York City.

**DARK ROOM PROCESSING (Chemical Tanks, etc.)**
Picker X-Ray Corp., 300 Fourth Ave., New York City.

**DEGASIFIERS**
American-British Chemical Inc., 180 Madison Ave., New York.
Foundry Services Inc., 280 Madison Ave., New York, N. Y.

**DEOXIDIZERS**
American Smelting & Refining Co., 120 Broadway, New York
Cleveland Flux Co., 1026 Main St., Cleveland, O.

**DESULPHURIZERS**
Cleveland Flux Co., 1026 Main St., Cleveland, O.
Hercules Powder Co., 999 Market St., Wilmington, Del.
Mathieson Alkali Works, Inc., 60 E. 42nd St., New York, N. Y.
Modern Equipment Co., Dept. 199, Port Washington, Wis.
Pittsburgh Plate Glass Co., Columbia Chemical Div., Grant Bldg., Pittsburgh, Pa.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

**DIES**
Acme Pattern & Tool Co., Inc., 232 N. Findlay St., Dayton, O.
City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit, Mich.

**DRILLS (Pneumatic)**
Cleveland Pneumatic Tool Co., 3781 East 77th St., Cleveland, O.
Gardner- Denver Co., Gardner Drive, Quincy, Ill.
Schramm Inc., West Chester, Pa.

**DRILL PRESSES**
Delta Mfg. Co., Industrial Div., 620 E. Vienna Ave., Milwaukee, Wis.

**DRIVES (Reciprocating)**
Ajax Flexible Coupling Co., Westfield, N. Y.

**DRUMS (Magnetic)**
Dings Magnetic Separator Co., 512 E. Smith St., Milwaukee, Wis.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee, Wis.

**DUMP HOPPERS**
Roura Iron Works, 1405 Woodland Ave., Detroit, Mich.

**DUST ARRESTING EQUIPMENT**
American Air Filter Co., Inc., 266 Central Ave., Louisville, Ky.
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
C. O. Bartlett & Snow Co., 6201 Harvard Ave., Cleveland, O.
Buell Engineering Co., 14 Cedar St., New York, N. Y.
R. C. Mahon Co., 8650 Mt. Elliott Ave., Detroit, Mich.
Newcomb-Detroit Co. Inc., 5751 Russell St., Detroit, Mich.
Pangborn Corp., Hagerstown, Md.
Parsons Engineering Corp., Cleveland, O.
Peters-Dalton Inc., 628 E. Forest Ave., Detroit, Mich.
Ruemelin Mfg. Co., 3850 N. Palmer St., Milwaukee, Wis.
Claude B. Schneible Co., 3953 Lawrence Ave., Chicago, Ill.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland, O.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

**DUST RECOVERY SYSTEMS**
Buell Engineering Co., 14 Cedar St., New York City.
Parsons Engineering Corp., Cleveland, O.

**ELECTRIC FURNACES** (see Furnaces Electric)

**ELEVATORS**
Standard Conveyor Co., North St. Paul, Minn.

**ELECTRIC WIRING DEVICES**
Ideal Commutator Dresser Co., Sycamore, Ill.

**ELEVATORS (Bucket)**
C. O. Bartlett & Snow Co., 6201 Harvard Ave., Cleveland, O.
Manhattan Rubber Mfg. Div. of Raybestos Manhattan Inc., Passaic, N. J.

**ELEVATORS (Material Handling)**
Link Belt Co., 300 W. Pershing Rd., Chicago, Ill.

**ELEVATORS (Pneumatic, Material Handling)**
Fuller Company, Catasaqua, Pa.

**ENGINEERING SERVICE (Foundry)**
Edwin S. Carman, Lee Rd. at Mayfield, Cleveland, O.

*When writing advertisers, please mention* THE FOUNDRY

# A Tested Abrasive
## PROVES ITS ECONOMY . . . .

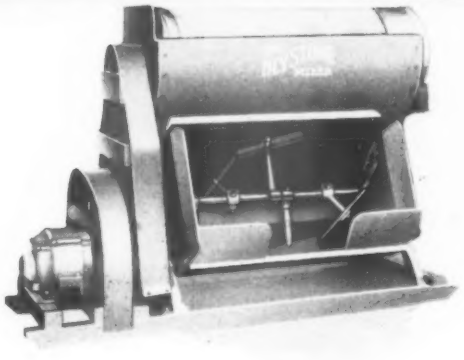
Globe's "H. C." Chilled Shot and Cornered Steel Grit have been through the exacting performance tests of foundries for over 36 years. They have proven their economy. These steel abrasives are helping foundry cleaning rooms establish a high-speed, precision cleaning routine that assures the delivery of vital castings to war equipment on schedule. To keep your production uninterrupted, count on "H. C." Chilled Shot and Cornered Steel Grit.

H. C. CHILLED GLOBE SHOT

**GLOBE STEEL ABRASIVE CO.**

**MANSFIELD, OHIO**

# BLYSTONE
## • MIXERS •



THE paddle-type mixer for core sand mixing in the foundry. Blystone Mixers offer: low mix cost, thorough mixing, and easy operation. There is a sturdily built type and size for your problem. Send for the new Bulletin and full details.

• BLYSTONE DIVISION •
STANDARD SAND & MACHINE CO.
549 W. Washington Boulevard, Chicago, Illinois

## BURNS CAUSE ABSENTEEISM

a Simple Solution . . .

**cōfēn for BURNS**

*Manufactured and Sold by*

**LEE-WOOD, Inc.**

SOUTH NORWALK . CONN.

*DOUBLE YOUR PRODUCTION — with the fastest and most powe ful Rammer made —*

# NO. 4 DAYTON RING VALVE BENCH RAMMER

Aside from its efficiency, the chief advantage of this Rammer lies in its long life. The Valve Unit will last for years without repair or replacement. The Cylinder Bore and Piston Rod are HARD CHROME PLATED, features which double the life of the Rammer and reduce maintenance costs at least one-half.

Have been adopted as standard by some of the largest users of Rammers throughout the Country. MADE IN FIVE SIZES. Send for Bulletin No. 300.

DAYTON PNEUMATIC TOOL CO., DAYTON, O.

# CARMAN ENGINEERS

**SATISFIED WITH YOUR PRODUCTION ? ?**

Do your methods produce the output you desire with present plant and equipment or do hidden waste and inefficiency cut deep into monthly production? Rearrangement of equipment and improved methods will eliminate waste, reduce costs, and secure a peak production.

**EDWIN S. CARMAN, INC.**

*Foundry Engineers and Consultants*

LEE RD. AND MAYFIELD—CLEVELAND, OHIO

SCIENTIFIC Pressure Cast MATCH PLATES

You GET
True Reproductions.
Accurate Partings.
Lower Plate Cost.

You SAVE
Expensive Pattern Duplication.
Excessive Cleaning Costs

You AVOID
Center Shrinks, Draws at Parting

The SCIENTIFIC CAST PRODUCTS Corp.

1388-1392 E. 40th St., CLEVELAND, O.

505-507 S. Western Ave., CHICAGO, ILL.

# WHERE-TO-BUY

**ENGINEERING SERVICE (Cont'd.)**
Giele, Walter, Co., First National Bank Bldg., Lebanon, Pa.
Chas. C. Kawin Co., 431 S. Dearborn St., Chicago, Ill.
A. A. Wickland Co., 205 W. Wacker Dr., Chicago, Ill.

**EXHAUST SYSTEMS**
American Air Filter Co., Inc., 266 Central Ave., Louisville, Ky.
American Foundry Equipment Co., 505 S. Byrkit St. Mishawaka, Ind.
DeBothezat Ventilating Equip. Div., American Machine & Metals Co., East Moline, Ill.
Pangborn Corporation, Hagerstown, Md.
Parsons Engineering Corp., Cleveland, O.
Claude B. Schneible Co., 3953 Lawrence Ave., Chicago, Ill.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland, O.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.

**EYE SHIELDS and GOGGLES—See Goggles**

**FABRICATORS (Metal)**
Roura Iron Works, 1405 Woodland Ave., Detroit, Mich.

**FACINGS**
Delta Oil Products Co., Milwaukee, Wis.
Frederic B. Stevens, Inc., Detroit, Mich.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland, O.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis St., Philadelphia, Pa.
Titanium Alloy Mfg. Co., Niagara Falls, N. Y.
United States Graphite Co., Saginaw, Mich.
E. J. Woodison Co., 7515 St. Aubin Ave., Detroit, Mich.

**FANS (Ventilating, Exhaust, Cooling, etc.)**
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
DeBothezat Ventilating Equip. Div., American Machine & Metals Co., East Moline, Ill.
General Blower Co., 406 N. Peoria St., Chicago, Ill.
Mahr Mfg. Co. Div. of Diamond Iron Works Inc., Minneapolis, Minn.
Pangborn Corp., Hagerstown, Md.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.

**FEEDERS (Rotary)**
Fuller Company, Catasaqua, Pa.

**FEEDERS (Sand)**
C. O. Bartlett & Snow Co., 6201 Harvard Ave., Cleveland, O.

**FERROCHROME**
Hickman-Williams & Co., Cleveland, O.
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York, N. Y.
Ohio Ferro-Alloys Corp., Canton, O.

**FERROMANGANESE**
Bethlehem Steel Co., Bethlehem, Pa.
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York, N. Y.
Ohio Ferro-Alloys Corp., Canton, O.

**FERROMOLYBDENUM**
Climax Molybdenum Co., 500 Fifth Ave., New York, N. Y.
Molybdenum Corporation of America, Pittsburgh, Pa.

**FERROSILICON**
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York, N. Y.
Globe Iron Co., Jackson, Ohio.
Jackson Iron & Steel Co., Jackson, O.
Ohio Ferro-Alloys Corp., Canton, O.

**FERROTITANIUM**
Titanium Alloy Mfg. Co., Niagara Falls, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York City

**FERROTUNGSTEN**
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York, N. Y.

**FERROVANADIUM**
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York, N. Y.

**FILMS (X-Ray)**
Picker X-Ray Corp., 300 Fourth Ave., New York City.

**FILTERS (Air)**
American Air Filter Co., 266 Central Ave., Louisville, Ky.

**FILTERS (Air) (Cont'd.)**
Staynew Filter Co., 36 Centre Pk., Rochester, N. Y.

**FILTERS (All Types)**
Staynew Filter Co., 36 Centre Pk., Rochester, N. Y.

**FIRE BRICK**
Electro Refractories & Alloys Corp., 62 Andrews Bldg., Buffalo, N. Y.
Frederic B. Stevens, Inc., Detroit, Mich.
Haws Refractories Co., Johnstown, Pa.
Illinois Clay Products Co., Joliet, Ill.
Ironton Fire Brick Co., Ironton, O.
Norton Co., Worcester, Mass.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis St., Philadelphia, Pa.
Chas. Taylor Sons Co., Cincinnati, O.

**FIRE CLAY**
Eastern Clay Products, Inc., Eifort, O.
Great Lakes Foundry Sand Co., United Artists Bldg., Detroit, Mich.
Illinois Clay Products Co., Joliet, Ill.
Ironton Fire Brick Co., Ironton, O.
Lawrence Clay Co., 112 Columbia St., Jackson, O.
Chas. Taylor Sons Co., Cincinnati, O.

**FIRE SAND**
Carborundum Co., Niagara Falls, N. Y.
Cleveland Quarries Co., 1125 Builders Exchange Bldg., Cleveland, Ohio.

**FIRESTONE**
Cleveland Quarries Co., 1125 Builders Exchange Bldg., Cleveland, O.
Great Lakes Foundry Sand Co., United Artists Bldg., Detroit, Mich.

**FIRST AID (For Burns)**
Lee-Wood, Inc., South Norwalk, Conn.

**FLASKS (Aluminum)**
Adams Co., 700 Foster St., Dubuque, Iowa.
American Foundry Equipment Co., Mishawaka, Ind.
Fremont Flask Co., Fremont, O.
Hines Mfg. Co., 1324 Hird Ave., Cleveland, O.

**FLASKS (Dowmetal)**
American Foundry Equipment Co., Mishawaka, Ind.
Frement Flask Co., Fremont, O.
Hines Mfg. Co., 1324 Hird Ave., Cleveland, O.

**FLASKS (Slip)**
Adams Co., 700 Foster St., Dubuque, Ia.
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Fremont Flask Co., Fremont, O.
Freeman Supply Co., Toledo, O.
Hines Mfg. Co., 1324 Hird Ave., Cleveland, O.

**FLASKS (Snap)**
Adams Co., 700 Foster St., Dubuque, Iowa.
American Foundry Equipment Co. 505 S. Byrkit St., Mishawaka, Ind.
Arcade Manufacturing Co., Freeport, Ill.
Diamond Clamp & Flask Co., Richmond, Ind.
Frederic B. Stevens, Inc. Detroit, Mich.
Fremont Flask Co., Fremont, O.
Hines Mfg. Co., 1324 Hird Ave., Cleveland, O.

**FLASKS (Steel)**
Eichfeld, Wm. F., & Sons Co., 2550 No. 30th St., Milwaukee, Wis.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee, Wis.

**FLASK FITTINGS**
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland, O.

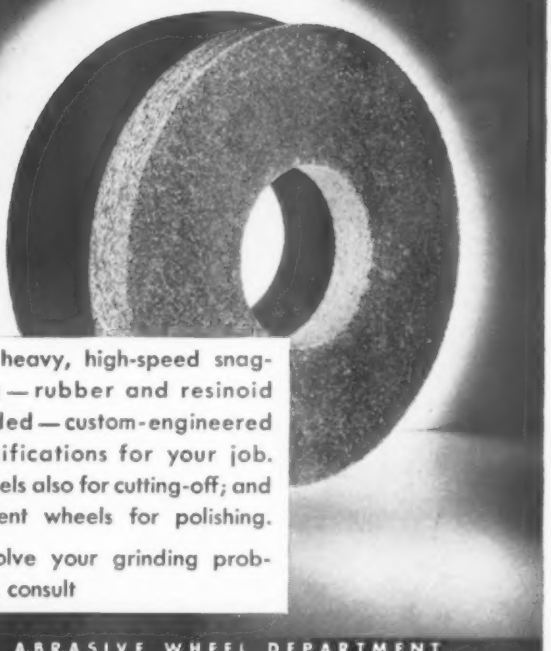
**FLASK LUMBER**
Dougherty Lumber Co., 4300 E. 68th St., Cleveland, O.
Reitz Lumber Co., 1800 N. Central Park Ave., Chicago, Ill.
Thomas & Proetz Lumber Co., 3400 N. Hall St., St. Louis, Mo.

**FLASKS (Wood)**
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago, Ill.

*—When writing advertisers, please mention* THE FOUNDRY—

## MANHATTAN ABRASIVE WHEELS

Custom-Engineered for Your Job



For heavy, high-speed snagging — rubber and resinoid bonded — custom-engineered specifications for your job. Wheels also for cutting-off; and resilient wheels for polishing.

To solve your grinding problems, consult

ABRASIVE WHEEL DEPARTMENT

THE MANHATTAN RUBBER MFG. DIVISION

OF RAYBESTOS-MANHATTAN, INC.

Executive Offices and Factories—77 Townsend St., Passaic, N.J.



ESTABLISHED 1788

THE E. & G. BROOKE IRON COMPANY

◆

*Manufacturers of*

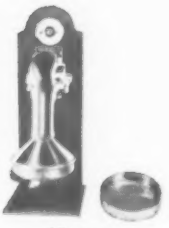
Basic, Malleable, Foundry, Forge and Low Phosphorus Pig Iron

◆

BIRDSBORO, PENNSYLVANIA



## SAND CONTROL



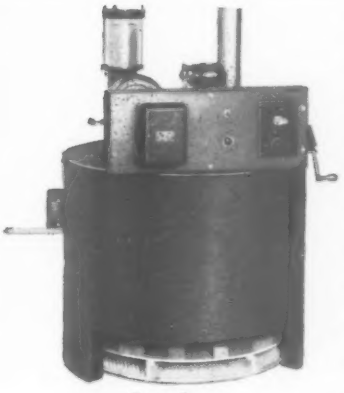
*Moisture Teller*

*Permeability Meter*

*Strength Machine*

Measure the moisture, permeability, green strength, deformation and dry strength of molding sands

## CORE TESTING



*Core Oven*

The Test Core Baking Oven is electrically heated for baking test cores entirely by convected heat. It is ideal for baking test specimens to determine the strength of core oils, binders, or the quality of core sands. Constructed in accordance with A.F.A. specifications.

## MODERN ANALYSIS

*Carbon Determinator*

Carbon Determinator provides accurate determinations of carbon in ferrous and non-ferrous materials for either preliminary or final analysis within two minutes exclusive of weighing time.

Sulphur Determinator provides accurate determinations within three minutes.

## SAND LABORATORY

Our complete sand laboratory and technicians solicit your test work on molding sands, core sands, silica sands, core oils, core binders, and bonding clays. Recommendations made for eliminating casting defects.

## HARRY W. DIETERT CO.

9330 Roselawn Ave.

DETROIT, MICH.

## Tough Going but NOT Too Tough

We know what gruelling punishment awaits wheels in a foundry. We operate our own foundry—and we use French & Hecht wheels. They don't mind heavy loads, rough floors and shocks—nor do they worry about abrasive grits that destroy ordinary wheel bearings. They were, in fact, built to consider tough going as normal.

You'll appreciate the dependability, the free-rolling quality of French & Hecht Industrial Wheels—whether steel or rubber tired—a size and type for every requirement.

Soon—we hope—rubber tires will again be available to general industry. We'll gladly send you complete information to enable you to plan NOW to enjoy the economies and better service of rubber tired wheel equipment THEN. We invite your inquiry.

*Write TODAY for CATALOG 3M*

**FRENCH & HECHT, INC.**
DAVENPORT, IOWA
WHEEL BUILDERS SINCE 1888

## ENGINEERING SERVICE

FOUNDRY PLANT LAYOUTS AND BUILDING PLANS
DESIGN OF SPECIAL FOUNDRY MACHINERY AND EQUIPMENT
APPRAISALS AND SURVEYS
LIQUIDATION OF SURPLUS PLANT

**WALTER GIELE CO.**
*Engineers . . . Foundry Specialists*
FIRST NATIONAL BANK BUILDING, LEBANON, PA.

WALTER S. GIELE, M. E.
REGISTERED PROFESSIONAL ENGINEER
TELEPHONE
LEBANON 1200

# LUMBER!

NORTHERN WHITE PINE
HARD MAPLE · MAHOGANY
WALNUT · CHERRY · CYPRESS

CUT-TO-SIZE CRATING

Manufacturers
SOUTHERN YELLOW PINE and HARDWOODS

*Carload or LCL shipments from our St. Louis yards or direct from our mills.*

*Thomas & Proetz Lumber Co.*
3405 N. HALL STREET
ST. LOUIS, MO.


## WHERE-TO-BUY

**FLEXIBLE SHAFT MACHINERY**
Mall Tool Co., 7720 South Chicago Ave., Chicago, Ill.
N. A. Strand Co., 3001 N. Wolcott Ave., Chicago, Ill.

**FLOORING (Non-Slip)**
Norton Co., Worcester, Mass.

**FLUXES**
American-British Chemical Inc., 180 Madison Ave., New York.
Cleveland Flux Co., 1026 Main St., Cleveland, O.
Foundry Services Inc., 280 Madison Ave., New York, N. Y.
Mathieson Alkali Works, Inc., 60 E. 42nd St., New York, N. Y.
National Gypsum Co., Buffalo, N. Y.
Niagara Falls Smelting & Refining Corp., 2204 Elmwood Ave., Buffalo, N. Y.
Pittsburgh Plate Glass Co., Columbia Chemical Div., Grant Bldg., Pittsburgh, Pa.

**FLUXES (Welding)**
Eutectic Welding Alloys Inc., 40 Worth St., New York City.

**FOUNDRY NAILS**
Capewell Mfg. Co., Hartford, Conn.

**FOUNDRY SUPPLY HOUSES**
Buckeye Products Co., 7022 Vine St., Cincinnati, O.
Combined Supply & Equipment Co., Inc., 215 Chandler St., Buffalo, N. Y.
Eastern Clay Products, Inc., Elfort, O.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland, O.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia, Pa.
Frederic B. Stevens, Inc., Detroit, Mich.
E. J. Woodison Co., 7515 St. Aubin Ave., Detroit, Mich.

**FURNACES, (Aluminum & Magnesium Billets)**
Despatch Oven Co., Minneapolis, Minn.

**FURNACES, (Aluminum & Magnesium Forgings)**
Despatch Oven Co., Minneapolis, Minn.

**FURNACES, (Aluminum Rivet Heating)**
Despatch Oven Co., Minneapolis, Minn.

**FURNACE LININGS**
Campbell-Hausfeld Co., Harrison, O.
Carborundum Co., Niagara Falls, N. Y.
Electro Refractories & Alloys Corp., 62 Andrews Bldg., Buffalo, N. Y.
Fisher Furnace Co., 5535 N. Wolcott Ave., Chicago, Ill.
Ironton Fire Brick Co., Ironton, O.
Ramtite Company, Div. of S. Obermayer Co., 1805 S. Rockwell St., Chicago, Ill.
Stroman Furnace & Engineering Co., 300 W. Adams St., Chicago, Ill.
United States Graphite Co., Saginaw, Mich.

**FURNACES (Annealing)**
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland, O.
Despatch Oven Co., Minneapolis, Minn.
Electric Furnace Co., Salem, O.
Lindberg Engineering Co., 2448 West Hubbard, Chicago, Ill.
Mahr Manufacturing Co. Div., Diamond Iron Works Inc., Dept. F-10, Minneapolis, Minn.
Surface Combustion Co., Toledo, O.
Vulcan Corporation, 18th & Cherry Sts., Philadelphia, Pa.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

**FURNACES (Crucible Melting)**
Ajax Metal Co., Philadelphia, Pa.
Campbell-Hausfeld Co., 300-320 Moore St., Harrison, O.
Fisher Furnace Co., 5535 N. Wolcott Ave., Chicago, Ill.
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland, O.
Mahr Mfg. Co. Div. of Diamond Iron Wks. Inc., Dept. F-10, Minneapolis, Minn.
Stroman Furnace & Engineering Co., 300 W. Adams St., Chicago, Ill.

**FURNACES (Electric Melting)**
Ajax Metal Co., Philadelphia, Pa.
American Bridge Co., Pittsburgh, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Electric Furnace Co., Salem, O.

**FURNACES (Electric Melting) (Cont'd.)**
Hydro-Arc Furnace Corp., 561 Hillgrove Ave., La Grange, Ill.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Swindell-Dressler Corp., Pittsburgh, Pa.

**FURNACES (Gas or oil fired)**
Campbell-Hausfeld Co., Harrison, O.
Electric Furnace Co., Salem, O.
Fisher Furnace Co., 5535 N. Wolcott Ave., Chicago, Ill.
Haynes Foundry Equipment Co., 1734 Lake St., Kalamazoo, Mich.
Lindberg Engineering Co., 2448 West Hubbard, Chicago, Ill.
Stroman Furnace & Engineering Co., 300 W. Adams St., Chicago, Ill.
Surface Combustion Co., Toledo, O.
Vulcan Corporation, 18th & Cherry Sts., Philadelphia, Pa.

**FURNACES (Gray Iron Melting)**
American Bridge Co., Pittsburgh, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Hydro-Arc Furnace Corp., 561 Hillgrove Ave., La Grange, Ill.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Swindell-Dressler Corp., Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

**FURNACES (Heat Treating)**
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland, O.
Despatch Oven Co., Minneapolis, Minn.
Electric Furnace Co., Salem, O.
Lindberg Engineering Co., 2448 West Hubbard, Chicago, Ill.
Maehler, Paul, Co., 2200 W. Lake St., Chicago, Ill.
Mahr Manufacturing Co. Div., Diamond Iron Works Inc., Dept. F-10 Minneapolis, Minn.
Surface Combustion Co., Toledo, O.
Vulcan Corporation, 18th & Cherry Sts., Philadelphia, Pa.

**FURNACES, Heat Treating (Electric)**
Despatch Oven Co., Minneapolis, Minn.
Lindberg Engineering Co., 2448 West Hubbard, Chicago, Ill.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

**FURNACES, Heat Treating (Oil or Gas)**
Despatch Oven Co., Minneapolis, Minn.

**FURNACES (Malleable)**
Mahr Manufacturing Co. Div., Diamond Iron Works Inc., Dept. F-10 Minneapolis, Minn.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.

**FURNACES (Malleable Annealing)**
Electric Furnace Co., Salem, O.
General Electric Co., Schenectady, N. Y.
Lindberg Engineering Co., 2448 West Hubbard, Chicago, Ill.
Surface Combustion Co., Toledo, O.
Young Brothers Co., 6508 Mack Ave., Detroit, Mich.

**FURNACES (Malleable Melting)**
American Bridge Co., Pittsburgh, Pa.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125, Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

**FURNACES (Nonferrous melting)**
Ajax Metal Co., Philadelphia, Pa.
Campbell-Hausfeld Co., 300-320 Moore St., Harrison, O.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Fisher Furnace Co., 5535 N. Wolcott Ave., Chicago, Ill.
Haynes Foundry Equipment Co., 1734 Lake St., Kalamazoo, Mich.
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland, O.
Stroman Furnace & Engineering Co., 300 W. Adams St., Chicago, Ill.
Swindell-Dressler Corp., Pittsburgh, Pa.

# CLEANBLAST

*Total War Demands 100% Production!*

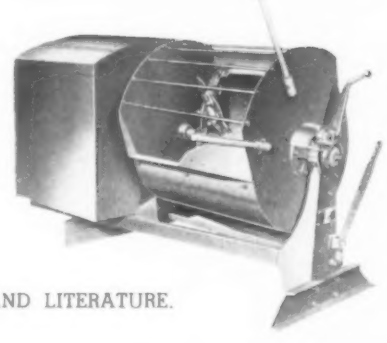
"CLEANBLAST" maintains production in the cleaning of castings, forgings, heat treated metal parts, shells, bombs and armor plate in plants all over the country. A Cleanblast Engineer is always available to help solve your blast problems. Write for complete information.

**ALLOY METAL ABRASIVE COMPANY**

311 W. HURON ST. ANN ARBOR, MICHIGAN

**FOUNDRY *MIXERS***

Fast, dependable core sand Mixers. Triple mixing hoes assure thorough action. Flared drum for quick easy charging and discharge. Available with replaceable full hard abrasion resisting drum liner at slight extra cost. WRITE FOR INFORMATION AND LITERATURE.



**CONSTRUCTION MACHINERY CO.**

WATERLOO, IOWA

MIXERS • PUMPS • HOISTS
BATCHING & PLACING EQUIP.
SAWS • CARTS • BARROWS

## DESIGN ENGINEER

Manufacturer of Dust Collectors for more than twenty years, rated high first credit in Dun & Bradstreet, doing large successful business, has permanent opening for a Design Engineer with following qualifications:

1. Preferably a man with experience in air and dust handling and the design of industrial dust and fume control and collecting equipment. Position requires initiative, technical ability, and experience to develop practical and workable equipment. Must have had successful record in designing machinery. Age 27 to 45.

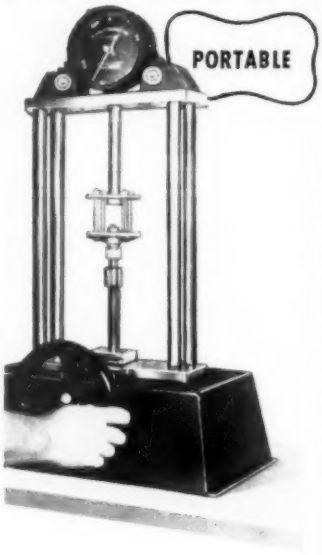
2. All replies will be treated in absolute confidence, and neither employer or references communicated with until we have your written permission. Compensation good. This is an unusual opportunity for capable, progressive engineer who is interested in a good future.

3. To have consideration, give complete abstract of business experience, age, education, present compensation, salary expected to start, number of dependents, and send snapshot not to be returned.

*Address:*

**BOX 205 — THE FOUNDRY — CLEVELAND, O.**

# Dillon TENSILE TESTER




SERVING:

VULTEE • BELL
CHRYSLER • TALON
WESTINGHOUSE

★

CONSOLIDATED
CURTISS-WRIGHT
GENERAL MOTORS

★

U. S. SIGNAL CORPS
PERUVIAN NAVY
REPUBLIC STEEL

*Plus*
*Scores of Others . . .*
*Testing Many Materials*

**10,000 POUNDS CAPACITY**

Weight: 83 pounds; height: 32 inches—yet allowing all type stress tests up to 10,000 pounds! **Seven capacities available.** Tests wide range of materials. Extremely accurate, easy to operate, low in cost

*Write to Dept. B. F.*

**W. C. DILLON & CO., INC.** 5410 W. HARRISON STREET CHICAGO, ILLINOIS

POLLY
**HI-TEMP COTE**
(HIGH TEMPERATURE)
**CORE & MOLD WASH**
NOW IN ACTIVE SERVICE
IS A COMPLETE UNIFORM WASH FOR
**STEEL FOUNDRIES**
● ADD ONLY WATER

**POLLARD**
**OIL PRODUCTS COMPANY**
1627 SOUTH 44th ST. MILWAUKEE, WIS.



**WILLIAMS *Buckets***

**"HOOK-ON"**
**SINGLE LINE**
***Special Type for***
**FOUNDRY SERVICE**
***3/8 to 2 cu. yd. cap.***
Send for descriptive bulletin.
**THE WELLMAN ENGINEERING CO.**
7019 Central Ave. Cleveland, Ohio

***built by* WELLMAN**


## WHERE-TO-BUY

**FURNACES (Powdered Coal)**
Surface Combustion Co., Toledo, O.
Whiting Corp.,
15607 Lathrop Ave., Harvey, Ill.

**FURNACES (Steel Melting)**
American Bridge Co.,
Pittsburgh, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co.,
Bay City, Mich.
Hydro-Arc Furnace Corp., 561 Hillgrove Ave., La Grange, Ill.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1125,
Pittsburgh, Pa.
Swindell-Dressler Corp.,
Pittsburgh, Pa.

**FURNACE BLOWERS**
Campbell-Hausfeld Co.,
Harrison, O.
Fisher Furnace Co.,
5535 N. Wolcott Ave., Chicago, Ill.
Roots-Connersville Blower Corp.,
Connersville, Ind.

**GAGES**
Acme Pattern & Tool Co., Inc.,
232 N. Findlay St., Dayton, O.

**GAGGERS**
Federal Foundry Supply Co.,
4600 E. 71st St., Cleveland, O.

**GANNISTER**
Great Lakes Foundry Sand Co.,
United Artists Bldg., Detroit, Mich.

**GAS (Oxygen, Acetylene, Industrial)**
Air Reduction Sales Co., 60 East 42nd St., New York, N. Y.

**GAS BURNERS**
Fisher Furnace Co., 5535 N. Wolcott Ave., Chicago, Ill.
Mahr Mfg. Co., Div., Diamond Iron Wks. Inc., Minneapolis, Minn.
North American Mfg. Co.,
2910 E. 75th St., Cleveland, O.
Surface Combustion Co., Toledo, O.

**GLOVES (Industrial, Safety)**
American Optical Co.,
Southbridge, Mass.
Industrial Gloves Co.,
203 Garfield Blvd., Danville, Ill.

**GLUE**
Franklin Glue Co., 1157 Cleveland Ave., Columbus, O.
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland, O.

**GOGGLES and EYE PROTECTORS**
American Optical Co.,
Southbridge, Mass.
Mine Safety Appliances Co.,
Braddock, Thomas and Meade Sts., Pittsburgh, Pa.
Wahlert Products Corp., 25 Lafayette St., Brooklyn, N. Y.

**GRAPHITE**
Federal Foundry Supply Co.,
4600 E. 71st St., Cleveland, O.
J. S. McCormick Co., 25th St. & A.V.R.R., Pittsburgh, Pa.
United States Graphite Co.,
Saginaw, Mich.

**GRINDERS (Electric Portable)**
Chicago Pneumatic Tool Co.,
General Offices: 8 East 44th St., New York.
Chicago Wheel & Mfg. Co.,
Dept. FD, 1101 W. Monroe,
Chicago, Ill.
U. S. Electrical Tool Co.,
Cincinnati, O.

**GRINDERS (Face)**
Diamond Machine Co., 2418 Aramingo St., Philadelphia, Pa.

**GRINDERS (Flexible Shaft)**
Chicago Wheel & Mfg. Co.,
Dept. FD, 1101 W. Monroe,
Chicago, Ill.
Mall Tool Co., 7720 South Chicago Ave., Chicago, Ill.
N. A. Strand Co., 5001 N. Wolcott Ave., Chicago, Ill.

**GRINDERS (Pneumatic Portable)**
Chicago Pneumatic Tool Co.,
General Offices: 8 East 44th St., New York.
Cleveland Pneumatic Tool Co.,
3781 East 77th St., Cleveland, O.

**GRINDERS (Surface, Bench, Disc, Floor)**
Chicago Wheel & Mfg. Co.,
Dept. FD, 1101 W. Monroe,
Chicago, Ill.
Delta Mfg. Co., Industrial division,
620 E. Vienna Ave.,
Milwaukee, Wis.
Fox Grinders, Inc., Oliver Bldg.,
Pittsburgh, Pa.

**GRINDERS (Surface, Bench, Disc, Floor) (Cont'd.)**
Hammond Machinery Builders,
1605 Douglas Ave.,
Kalamazoo, Mich.
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland, O.
Mall Tool Co., 7720 South Chicago Ave., Chicago, Ill.
Safety Grinding Wheel & Mach. Co.,
Springfield, O.
N. A. Strand Co., 5001 N. Wolcott Ave., Chicago, Ill.
U. S. Electrical Tool Co.,
Cincinnati, O.
Vonnegut Moulder Corp., 1839 Madison Ave., Indianapolis, Ind.

**GRINDERS (Swing Frame)**
Fox Grinders, Inc., Oliver Bldg.,
Pittsburgh, Pa.
Mall Tool Co., 7720 South Chicago Ave., Chicago, Ill.
Safety Grinding Wheel & Mach. Co.,
Springfield, O.
Vonnegut Moulder Corp., 1839 Madison Ave., Indianapolis, Ind.

**GRINDING WHEEL DRESSERS**
Carborundum Co.,
Niagara Falls, N. Y.
Chicago Wheel & Mfg. Co.,
Dept. FD, 1101 W. Monroe,
Chicago, Ill.
Desmond-Stephan Mfg. Co.,
Urbana, O.
Simonds Worden White Co.,
Dayton, O.
Western Tool & Mfg. Co.,
Springfield, O.

**GRINDING MACHINERY**
Hammond Machinery Builders,
1605 Douglas Ave.,
Kalamazoo, Mich.

**GRINDING WHEELS—See ABRASIVE WHEELS**

**GRINDSTONES**
Sterling Grinding Wheel Co.,
Tiffin, O.
Bay State Abrasive Products Co.,
Westboro, Mass.

**GRIT (Abrasive)**
Alloy Metal Abrasive Co.,
Ann Arbor, Mich.
American Foundry Equipment Co.,
505 S. Byrkit St., Mishawaka, Ind.
American Steel Abrasives Co.,
Galion, O.
Carborundum Co.,
Niagara Falls, N. Y.
Dreisbach Engineering Corp.,
45 Warburton Ave., Yonkers, N. Y.
Globe Steel Abrasive Co.,
Mansfield, O.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co.,
Pittsburgh, Pa.
Simonds Worden White Co.,
Dayton, O.

**HAMMERS (Chipping)**
Chicago Mfg. & Distributing Co.,
1928 W. 46th St., Chicago, Ill.
Chicago Pneumatic Tool Co.,
General Offices: 8 East 44th St., New York.
Cleveland Pneumatic Tool Co.,
3781 East 77th St.,
Cleveland, O.
Schramm Inc., West Chester, Pa.

**HAMMERS (Rawhide)**
Chicago Rawhide Mfg. Co.,
1384 Elston Ave., Chicago, Ill.

**HAND PADS (Leather)**
Chicago Rawhide Mfg. Co.,
1384 Elston Ave., Chicago, Ill.

**HARDNESS TESTING EQUIPMENT**
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit, Mich.

**HEAT CONTROL AND RECORDING DEVICES**
Foxboro Co., Foxboro, Mass.
Illinois Testing Laboratories,
418 N. LaSalle St., Chicago, Ill.
Lindberg Engineering Co.,
2448 West Hubbard, Chicago, Ill.
Marshall Co., L. H., 270 W. Lane,
Columbus, O.

**HEAT TREATING SERVICE**
Lakeside Steel Improvement Co.,
5418 Lakeside Ave., Cleveland, O.

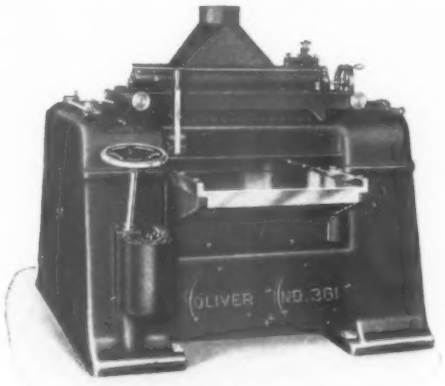
**HEATERS (Direct Fired)**
Despatch Oven Co.,
Minneapolis, Minn.

**HEATERS (Indirect Fired)**
Despatch Oven Co.,
Minneapolis, Minn.

**HEATERS (Gas, Oil, Electric)**
Despatch Oven Co.,
Minneapolis, Minn.

*—When writing advertisers, please mention* THE FOUNDRY—

# OLIVER
## No. 361 Surface Planer




This modern, high-grade planer is designed to perform with a wide range in capacity and speed for both hard and soft wood. Rigid, dependable and compact it meets every requirement in a pattern shop planer.

*Write for Complete Information*

**OLIVER MACHINERY CO.**

GRAND RAPIDS, MICH.

THE
WADSWORTH CORE MACHINE
AND EQUIPMENT COMPANY

◆

*Manufacturers of*
AMERICAN "RAPID"
"HAMMER" and "WADSWORTH"
Stock Core Making Machines

◆

Cutting Off and Coning Machines

◆

Steel Reinforced
Core and Bottom Plates

◆

AKRON, OHIO

# A.B.C. FOUNDRATES
Reg. Trade-Mark

SCIENTIFICALLY BLENDED

# FLUXES

Widely Used for Treating:

- ALUMINUM ALLOYS
- BRASSES
- BRONZES
- COPPER ALLOYS
- NICKEL ALLOYS
- GREY IRON

A. B. C. Foundrates:

- PROTECT
- REFINE
- PURIFY
- DEGASS

Also Recommended for
Recovering Good Metal from

- SKIMMINGS
- TURNINGS
- DROSSES

Our metallurgists will give technical advice on the use of A.B.C. Foundrates in your plant. Submit your problem, or write for further information. Address: Dept. F.

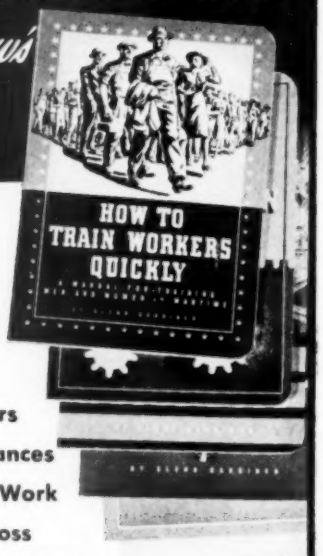
●

**American-British Chemical Supplies, Inc.**
180 Madison Avenue, New York
Telephone: AShland 4-2265

TO HELP YOUR FOREMEN MEET

*today's and tomorrow's*

PROBLEMS




ELLIOTT SERVICE CO.
offers
7 PRACTICAL MANUALS
by
*Glenn Gardiner*

1. How to Cut Waste
2. How to Correct Workers
3. How to Handle Grievances
4. How to Get Out More Work
5. Qualities of a Good Boss
6. How to Train Workers Quickly
7 How to Create Job Satisfaction

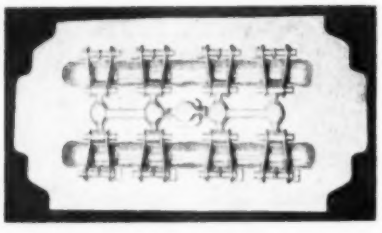
*Price for Set of 7 Manuals—$2.65*

Write for special low prices for any or all manuals in quantity

LIMITED EDITION

ELLIOTT SERVICE CO., 219 E. 44th St., New York 17, N. Y.





Quality Precision Pressure-Cast Plates
Cope and Drag Plates · Multiple Core Boxes
MANY YEARS EXPERIENCE IN THIS FIELD
*Ask for List of Satisfied Customers—Write for Details*
PLASTER PROCESS CASTINGS CO.
6922 Carnegie Ave.—Cleveland, O.



FOR FASTER PRODUCTION
Use HAUCK

CUPOLA LIGHTERS
MOLD DRYERS
LADLE HEATERS
FURNACE BURNERS

Portable Suction and Compression Oil Burners; Core Oven and Furnace Oil Burners for every foundry. Write for Catalogs.

HAUCK MANUFACTURING CO., 106 Tenth St., Brooklyn, N. Y.


## WHERE-TO-BUY

**HEATERS (Liquid, Steam)**
Johnson Corporation, Three Rivers, Mich.

**HEATERS (Space, Unit, Oven, Water)**
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Maehler, Paul, Co., 2200 W. Lake St., Chicago, Ill.
Ross, J. O., Engineering Corp., 350 Madison Ave., New York
B. F. Sturtevant Co., Hyde Park, Boston, Mass.

**HELMETS (Blasting)**
American Foundry Equipment Co., 505 Byrkit St., Mishawaka, Ind.
American Optical Co., Southbridge, Mass.
Pangborn Corp., Hagerstown, Md.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland, O.

**HELMETS (Welding)**
American Optical Co., Southbridge, Mass.
Wahlert Products Corp., 25 Lafayette St., Brooklyn, N. Y.

**HOISTS (Air)**
Chicago Pneumatic Tool Co., General Offices: 8 East 44th St., New York.
Curtis Pneumatic Machinery Co., 1922 Kienlen Ave., St. Louis, Mo.
Gardner-Denver Co., Gardner Drive, Quincy, Ill.

**HOISTS (Chain)**
Chicago Tramrail Co., 2910 Carroll Ave., Chicago, Ill.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Reading Chain & Block Corp., 2108 Adams St., Reading, Pa.

**HOISTS (Electric)**
American Engineering Co., 2418 Aramingo St., Philadelphia, Pa.
Chicago Tramrail Co., 2910 Carroll Ave., Chicago, Ill.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Conco Engineering Works, Mendota, Ill.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh, Pa.
International Molding Machine Co., 2608 W. 16th St., Chicago, Ill.
Modern Equipment Co., Dept. 199, Port Washington, Wis.
Reading Chain & Block Corp., 2108 Adams St., Reading, Pa.
Shepard-Niles Crane & Hoist Corp., 360 Schuyler Ave., Montour Falls, N. Y.

**HOSE (Air, Blasting, Water, Gas)**
Cleveland Pneumatic Tool Co., 3781 East 77th St., Cleveland, O.
Gardner-Denver Co., Gardner Drive, Quincy, Ill.
Ingersoll-Rand Co., 11 Broadway, New York, N. Y.
Manhattan Rubber Mfg. Div. of Raybestos, Manhattan, Inc., 77 Townsend St., Passaic, N. J.
Pangborn Corp., Hagerstown, Md.
Schramm Inc., West Chester, Pa.

**HOSE FITTINGS**
New Haven Vibrator Co., 131 Chestnut St., New Haven, Conn.

**HYDRAULIC CLEANING EQUIPMENT**
Hydro-Blast Corp., 2560 N. Western Ave., Chicago, Ill.
Pangborn Corp., Hagerstown, Md.
N. Ransohoff, Inc., 208 W. 71st St., Cincinnati, O.

**ILLUMINATORS (X-Ray Film)**
Picker X-Ray Corp., 300 Fourth Ave., New York City.

**IMPREGNATING SYSTEMS (Magnesium Castings)**
Empire Varnish Co., 2636 E. 76th St., Cleveland, O.
Jackson & Church Co., Saginaw, Mich.

**INGOTS (Nonferrous)**
Ajax Metal Co., Philadelphia, Pa.
American Smelting & Refining Co., 120 Broadway, New York
Bohn Aluminum & Brass Corp., Detroit, Mich.
International Nickel Co. Inc., 67 Wall St., New York City.
River Smelting & Refining Co., 4195 Bradley, Cleveland, O.

**INSULATION (Rock Wool)**
National Gypsum Co., Buffalo, N. Y.

**IRON CEMENT**
Smooth-On Mfg. Co., 570 Communipaw Ave., Jersey City, N. J.

**IRON ORE**
Bethlehem Steel Co., Bethlehem, Pa.
Pickands, Mather & Co., Cleveland, O.

**IRON OXIDES**
Delta Oil Products Co., Milwaukee, Wis.
Pollard Oil Products Co., 1627 So. 44th St., Milwaukee, Wis.
Tamms Silica Co., 228 N. LaSalle St., Chicago, Ill.

**JACKETS (Mold)**
Adams Co., 700 Foster St., Dubuque, Ia.
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Freeman Supply Co., 1152 Broadway Toledo, Ohio.
Fremont Flask Co., Fremont, O.
Hines Mfg. Co., 1324 Hird Ave., Cleveland, O.

**LABORATORY EQUIPMENT (Chemical)**
Adolph I. Buehler, 228 N. LaSalle St., Chicago, Ill.
General Electric X-Ray Corp., Dept. N 37, 2012 Jackson Blvd., Chicago, Ill.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit, Mich.

**LABORATORY EQUIPMENT (Physical)**
Adolph I. Buehler, 228 N. LaSalle St., Chicago, Ill.
Dillon, W. C., & Co. Inc., 5410 W. Harrison St., Chicago, Ill.
General Electric X-Ray Corp., Dept. N 37, 2012 Jackson Blvd., Chicago, Ill.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit, Mich.
National Engineering Co., 549 W. Washington St., Chicago, Ill.
Norton Co., Worcester, Mass.

**LADLES**
Bethlehem Steel Co., Bethlehem, Pa.
Haynes Foundry Equipment Co., 1734 Lake St., Kalamazoo, Mich.
Industrial Equipment Co., Minster, O.
Modern Equipment Co., Dept. 199, Port Washington, Wis.
Frederic B. Stevens, Inc., Detroit, Mich.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

**LADLE HEATERS**
Hauck Mfg. Co., 106 Tenth St., Brooklyn, N. Y.

**LAYOUT DOPE**
Tamms Silica Co., 228 N. LaSalle St., Chicago, Ill.

**LEAD**
American Smelting & Refining Co., 120 Broadway, New York
River Smelting & Refining Co., 4195 Bradley, Cleveland, O.

**LIMESTONE**
Bethlehem Steel Co., Bethlehem, Pa.

**LININGS (Mixer Ladles)**
Ramtite Company, Div. of S. Obermayer Co., 1803 S. Rockwell St., Chicago, Ill.

**LINSEED OIL**
Hercules Powder Co., 999 Market St., Wilmington, Del.
Penola Inc., Pittsburgh, Pa.

**LOAD SKIDDERS**
Electric Wheel Co., Quincy, Ill.

**LOADERS**
Clearfield Machine Co., Clearfield, Pa.
National Engineering Co., 549 W. Washington St., Chicago, Ill.

**LUBRICANTS (Industrial)**
Penola Inc., Pittsburgh, Pa.
Swan-Finch Oil Corp., R.C.A. Bldg., West, New York.
United States Graphite Co., Saginaw, Mich.

**LUBRICATORS (Air Line)**
Jas. A. Murphy & Co., Hamilton, O.
New Haven Vibrator Co., 131 Chestnut St., New Haven, Conn.

**MACHINE KEYS**
Standard Horse Nail Corp., New Brighton, Pa.

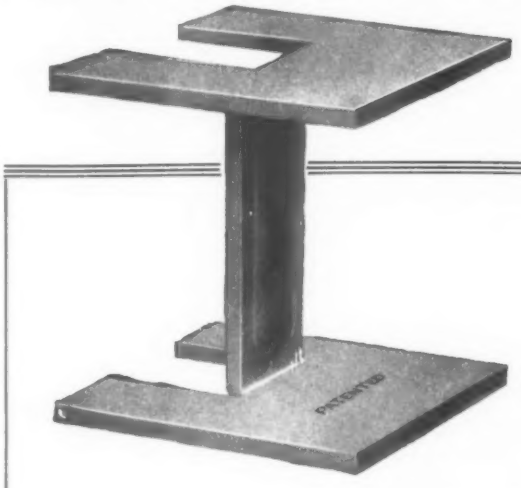
**MAGNETS**
Dings Magnetic Separator Co., 512 E. Smith St., Milwaukee, Wis.
Fisher Furnace Co., 3535 N. Wolcott Ave., Chicago, Ill.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee, Wis.

*—When writing advertisers, please mention* THE FOUNDRY—

# "PENNSYLVANIA"

# ONE-PIECE CHAPLETS

FOR LIGHT, MEDIUM AND HEAVY IRON AND STEEL CASTINGS



Check these qualities: Thoroughly plated to prevent rust and corrosion. Made in one piece from special selected metal. Can be bent or set to any angle without breaking. Perfect vent—no pockets to hold gas. No loose heads or stems. Corrugation in the stem increases compression strength. Amalgamates perfectly without chilling the metal. Slot in the head gives them a holding feature in the sand, and prevents washing from position. 100% perfect chaplets in every shipment.

**SIZE AND GAUGE OF STOCK USED IN PENNSYLVANIA ONE PIECE CHAPLETS**

| LENGTH | HEADS | GAUGE |
|---|---|---|
| ¼" | ⅜" x ⅜" | No. 19 Steel |
| ⅜" | ½" x ¾" | No. 19 " |
| ½" | ½" x ⅞" | No. 18 " |
| ⅝" | ½" x ⅞" | No. 18 " |
| ¾" | ⅝" x ⅞" | No. 18 " |
| ⅞" | ⅝" x ⅞" | No. 16 " |
| 1" | ¾" x ⅞" | No. 16 " |
| ¾" | ⅞" x 1" | No. 16 " |
| ⅞" | ⅞" x ⅞" | No. 16 " |
| 1" | 1" x 1⅛" | No. 15 " |
| 1⅛" | 1⅛" x 1⅛" | No. 15 " |
| 1¼" | 1¼" x 1⅜" | No. 13 " |
| 1⅜" | 1⅜" x 1⅜" | No. 13 " |
| 1½" | 1½" x 1⅜" | No. 12 " |
| 1⅝" | 1⅜" x 1⅜" | No. 12 " |
| 1¾" | 1¾" x 1⅜" | No. 12 " |
| 1⅞" | 1⅞" x 1⅞" | No. 11 " |
| 2" | 2" x 1⅞" | No. 11 " |

WRITE FOR WORKING SAMPLES AND PRICES

**THE ONE-PIECE CHAPLET CO.**
4001 ASHLAND STREET PHILADELPHIA, PENNSYLVANIA

# Improved Air-O-chek
## MODEL FA AIRGUN

1. Only AIR-O-CHEKS have the ball and socket joint connecting the enclosed lever to the valve.
2. Long ferrules formed over special shoulders on air gun and fitting reinforce union with hose and seal end of hose against grease or oil.
3. Factory assembly on hose of special quality and weight assures easy operation and long, trouble-free service.

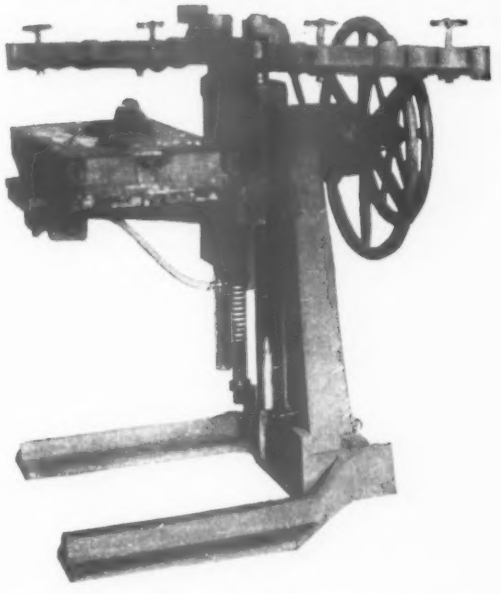
There's a reason for AIR-O-CHEK *leakproof operation and long, trouble-free service.* It's the *ball and socket joint connecting the enclosed lever to the valve,* thus providing proper leverage to open the valve with a slight flex of the hose—*no* other air gun or blow gun has this feature.

Until you've used AIR-O-CHEK Air Guns *you can't appreciate the easy, positive, almost magic operation* that saves air and time and maintenance.

AIR-O-CHEKS are precision machined from bar brass and stainless steel. Made in sizes and types for all requirements. Write for literature.

**AIR-WAY PUMP & EQUIP. CO., 405 S. Jefferson St., Chicago 7, Ill.**

MODEL C-414
## for Magnesium Molding



The machine illustrated is the Model C-414 in pattern drawn position. Capacity of flasks 36 x 46. This machine is being widely used for the accelerated magnesium castings production.

*Write for Details . . . Also Ask About Our*
SAND MIXERS, CORE OVENS, WEIGHING and METERING EQUIPMENT

**GRIMES MOLDING MACHINE COMPANY**
1429 Virginia Park Detroit 6, Mich.

Outside sand storage is too wasteful, too risky—plain terrible. With Neff & Fry bins you can order sand in quantities and save on price—safeguard against car shortage and exhaustion of supply. You can keep sand in condition at all times and reduce on lost castings. You can save on labor, floor space. You can pay for bins in no time out of benefits received.

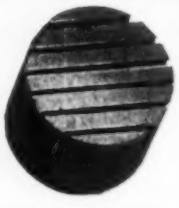
Modernize—install Neff & Fry bins (stave or monolithic). Broad guarantee given. Get 1943 Catalog.

**NEFF & FRY**
**BINS**

- Any Capacity
- Fast Erection
- Moderate Cost

Permanent Improvement for any Foundry.
Get 1943 Catalog.

THE NEFF & FRY CO.
CAMDEN, OHIO



**SMILLIE**
**CORE BOX VENTS**
**FOR BLOWING CORES**

Head of vent may be machined to fit any contour without removal from plate. Sizes: $\frac{1}{8}$" to 1" in $\frac{1}{16}$" steps.

WRITE FOR DESCRIPTIVE LITERATURE

**C. M. SMILLIE & CO.**
1100 Woodward Heights Blvd.
FERNDALE, MICHIGAN

**PATTERN, FLASK, CRATING**
**LUMBER**

Phone Diamond 1200

Highest Quality—Any Quantity

**DOUGHERTY LUMBER CO.**
4306 E. 68TH ST. · CLEVELAND, O.


## WHERE-TO-BUY

**MALLETS (Rawhide)**
Chicago Rawhide Mfg. Co., 1384 Elston Ave., Chicago, Ill.

**MANGANESE (Briquets)**
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York, N. Y.

**MATCHPLATES**
Acme Pattern & Tool Co., Inc., 232 N. Findlay St., Dayton, O.
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago, Ill.
City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit, Mich.
Hines Mfg. Co., 1324 Hird Ave., Cleveland, O.
Plaster Process Castings Co., 6922 Carnegie Ave., Cleveland, O.
Scientific Cast Products Corp., 1388-92 E. 40th St., Cleveland, O.

**MAULS**
Chicago Rawhide Mfg. Co., 1384 Elston Ave., Chicago, Ill.

**METAL CLEANING EQUIPMENT**
American Foundry Equipment Co., Mishawaka, Indiana
N. Ransohoff, Inc., 208 W. 71st St., Cincinnati, O.

**METALLOGRAPHIC EQUIPMENT**
Adolph I. Buehler, 228 N. LaSalle St., Chicago, Ill.
General Electric X-Ray Corp., Dept. N 37, 2012 Jackson Blvd., Chicago, Ill.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit, Mich.

**METALLURGISTS**
Chas. C. Kawin Co., 431 So. Dearborn St., Chicago, Ill.

**METERS (Gas, Air, Water)**
Illinois Testing Laboratories, Inc., 420 N. LaSalle St., Chicago, Ill.
Roots-Connersville Blower Corp., 302 Madison Ave., Connersville, Ind.

**METAL MARKING TOOLS**
Ideal Commutator Dresser Co., Sycamore, Ill.

**METAL RECLAIMING MILLS**
Dreisbach Engineering Corp., 45 Warburton Ave., Yonkers, N. Y.

**MICROSCOPES**
Adolph I. Buehler, 228 LaSalle St., Chicago, Ill.

**MITRE SAW BENCHES**
Tannewitz Works, Grand Rapids, Mich.

**MIXERS (Core Wash)**
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland, O.

**MIXERS (Sand and Clay)**
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Beardsley & Piper Co., The, 2541 N. Keeler Ave., Chicago, Ill.
Clearfield Machine Co., Clearfield, Pa.
Construction Machinery Co., Waterloo, Iowa.
Freeman Supply Co., 1152 Broadway Toledo, Ohio.
National Engineering Co., 549 W. Washington St., Chicago, Ill.
Royer Foundry & Machine Co., Kingston, Pa.

**MOISTURE CONTROL FOR DRY BLAST**
Surface Combustion Corp., Toledo, O.

**MOLD CONVEYORS**
C. O. Bartlett & Snow Co., 6201 Harvard Ave., Cleveland, O.
Beardsley & Piper Co., The, 2541 N. Keeler Ave., Chicago, Ill.
Link Belt Co., 300 W. Pershing Rd., Chicago, Ill.
National Engineering Co., 549 W. Washington St., Chicago, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.

**MOLD DRYERS**
Hauck Mfg. Co., 106 Tenth St., Brooklyn, N. Y.
Mahr Mfg. Co. Div. of Diamond Iron Works Inc., Minneapolis, Minn.

**MOLD OVENS and DRYERS**
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland, O.
Despatch Oven Co., Minneapolis, Minn.
Foundry Equipment Co., Cleveland, O.
Lanly Company, 750 Prospect Ave., Cleveland, O.
Maehler, Paul, Co., 2200 W. Lake St., Chicago, Ill.
Mahr Mfg. Co. Div. of Diamond Iron Works Inc., Minneapolis, Minn.

**MOLDERS BENCHES**
Western Tool & Mfg. Co., Springfield, O.

**MOLDING MACHINES**
Adams Co., 700 Foster St., Dubuque, Iowa.
Arcade Manufacturing Co., Freeport, Ill.
Beardsley & Piper Co., The, 2541 N. Keeler Ave., Chicago, Ill.
Berkshire Mfg. Co., 1111 Power Ave., Cleveland, O.
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Haynes Foundry Equipment Co., 1734 Lake St., Kalamazoo, Mich.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh, Pa.
International Molding Machine Co., 2608 W. 16th St., Chicago, Ill.
Johnston & Jennings Co., 867 Addison Rd., Cleveland, O.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.
Wm. H. Nicholls Co., Richmond Hill, Long Island, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.
Pioneer Mfg. Co., West Allis, Wis.
S P O Incorporated, 7500 Grand Division Ave., Cleveland, O.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia, Pa.

**MOLDING MACHINES (Jolt)**
Adams Co., 700 Foster St., Dubuque, Iowa.
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Haynes Foundry Equipment Co., 1734 Lake St., Kalamazoo, Mich.
Johnston & Jennings Co., 867 Addison Rd., Cleveland, O.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.
Wm. H. Nicholls Co., Richmond Hill, Long Island, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.
S. P O Incorporated, 7500 Grand Division Ave., Cleveland, O.

**MOLDING MACHINES (Rollover)**
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh, Pa.
International Molding Machine Co., 2608 W. 16th St., Chicago, Ill.
Johnston & Jennings Co., 867 Addison Rd., Cleveland, O.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.
Wm. H. Nicholls Co., Richmond Hill, Long Island, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.
S P O Incorporated, 7500 Grand Division Ave., Cleveland, O.

**MOLDING MACHINES (Squeeze)**
Acme Pattern & Tool Co., Inc., 232 N. Findlay St., Dayton, O.
Adams Company, 700 Foster St., Dubuque, Iowa.
Champion Foundry & Machine Co. 1314 W. 21st St., Chicago, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Haynes Foundry Equipment Co., 1734 Lake St., Kalamazoo, Mich.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh, Pa.
International Molding Machine Co., 2608 W. 16th St., Chicago, Ill.
Johnston & Jennings Co., 867 Addison Rd., Cleveland, O.

—When writing advertisers, please mention THE FOUNDRY—

Hammond

1, 2, 3 or 4 Speeds . . . 5 to 20 HP

SINGLE and MULTI-HI SPEED

**FOUNDRY GRINDERS**

Here you'll find the features that will give you higher production. Oversize bearings, spindles and shafts, precision machining of all moving parts and HAMMOND's "over-speed" control permitting wear of wheels right down to the flanges and still maintaining efficient peripheral speed. Safety guards feature HAMMOND deep well, "Never-Klog" design and hinged cover plate for easy access to wheels.

With plenty of power to spare, when the going is toughest, you can slam the biggest, roughest casting up against the wheel and know it will flash through with surging strength.

**HAMMOND MACHINERY BUILDERS, Inc., Kalamazoo 54, Mich.**

1605 Douglas Ave., Eastern Branch: 71 W. 23rd, New York 10, N.Y.

**AVAILABLE in TWO SIZES WR-1 & WR-2**

*Write for Complete Specifications*

☐ **WR-1,** *1, 2 and 3 Speeds; 5, 7 and 10 HP*

☐ **WR-2,** *2, 3 and 4 Speeds; 10, 15 and 20 HP*

*Also, Hammond Grinders for Magnesium — Write for Details!*

Hammond OF KALAMAZOO

# TIECO

## FOUNDRY LADLES

TIECO geared ladles eliminate binding or sticking gear troubles. This patented feature assures accurate pouring and long life, due to the absence of drops and jerks and all trouble due to distortion or springage of the Bail or Bowl or both, caused by heat is removed. TIECO Ladles come in all types and sizes and are furnished for manual or electric operation.

Write for descriptive literature.

**THE INDUSTRIAL EQUIPMENT COMPANY**

115 OHIO STREET · MINSTER, OHIO

**SILICA BRICK**
**FIRE BRICK**
**SLEEVES**
**NOZZLES**
**RUNNER BRICK**
**HOT TOPS**
**FIRE CLAY &**
**SILICA CEMENT**

*SINCE 1856*

★ ★ ★ ★ ★

*Pioneer Manufacturers of Refractory Products*

**HAWS REFRACTORIES COMPANY**

JOHNSTOWN, PENNSYLVANIA

**DETROIT, MICH.**

*General Motors Building. Phone: Trinity 1-1140*

**PITTSBURGH, PA.**

*Farmers Bank Building. Phone: Atlantic 1656*

The Wahlert carboy drainer is built on scientific lines, designed to prevent accidents caused by splashing and carelessness in pouring into smaller containers.

Uninterrupted flow of liquid is assured by the Air Vent which eliminates pumping or syphoning. This vent and the inverted spout are made of hard, acid-proof rubber which will stand considerable abuse and the cup is made of soft rubber which allows the drainer to be attached to carboys with slight differences in size of neck. All parts are replaceable.

SAFETY Wahlert PRODUCTS

**MADE IN THREE SIZES**
5 Gal. Size (1 1/2" to 2 1/2")
Standard Size (2 1/2" to 3") 10 to 13 Gallon
Large Size (3 1/4" to 3 1/2") Special Neck
*These dimensions are outside diameter.*
Send for Literature "F"

**WAHLERT PRODUCTS CORP**
INDUSTRIAL—SAFETY AND FIRE EQUIPMENT
25 LAFAYETTE ST., BROOKLYN, N. Y.

# FALLS BRAND

★

ALUMINUM AND ALLOYS
FLUXES AND FLUXING ALLOYS
HARDENERS
INTERMEDIATE ALLOYS
DEOXIDIZERS FOR EVERY METAL
ALUMINUM BRONZE
SILICON BRONZE
COPPER SHOT
NICKEL ALLOYS

*All in Stock for Immediate Shipment*

★

**NIAGARA FALLS SMELTING & REFINING CORPORATION**
**Head Office, Laboratory & Works, Buffalo, N. Y.**
*Annual Capacity 70,000,000 pounds*


## WHERE-TO-BUY

**MOLDING MACHINES (Squeeze) (Cont'd.)**

Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.
Wm. H. Nicholls Co., Richmond Hill, Long Island, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.
S P O Incorporated, 7500 Grand Division Ave., Cleveland, O.

**MOLDING SANDS**

Great Lakes Foundry Sand Co., United Artists Bldg., Detroit, Mich.
Ottawa Silica Co., Ottawa, Ill.

**MOLD WASH**

Dayton Oil Co., Dayton, O.
Delta Oil Products Co., Milwaukee, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland, O
Pollard Oil Products Co., 1627 So. 44th St., Milwaukee, Wis.
United States Graphite Co., Saginaw, Mich.

**MOLYBDENUM**

Molybdenum Corporation of America, Pittsburgh, Pa.

**MONORAIL SYSTEMS**

American Monorail Co., 13104 Athens Ave., Cleveland, O.
Chicago Tramrail Co., 2910 Carroll Ave., Chicago, Ill.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Modern Equipment Co., Dept. 199, Port Washington, Wis.

**MOTOR CONTROL**

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

**MOTORS (Electric)**

Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.
Master Electric Co., Dayton, O.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

**MOTOR MAINTENANCE TOOLS (Portable)**

Ideal Commutator Dresser Co., Sycamore, Ill.

**NAILS (Chill)**

Bethlehem Steel Co., Bethlehem, Pa.
Capewell Mfg. Co., Hartford, Conn.
Republic Steel Corp., Cleveland, O.

**NICKEL**

International Nickel Co. Inc., 67 Wall St., New York City.

**NOZZLES (Blasting)**

American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Davenport Machine & Foundry Co., Davenport, Iowa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland, O.
Great Lakes Foundry Sand Co., United Artists Bldg., Detroit, Mich.
Norton Co., Worcester, Mass.
Pangborn Corp., Hagerstown, Md.
W. W. Sly Mfg. Co., 4733 Train Ave., Cleveland, O.

**OIL BURNERS**

Fisher Furnace Co., 5535 N. Wolcott Ave., Chicago, Ill.
Stroman Furnace & Engineering Co., Div. of Peterson Oven Co., 300 W. Adams St., Chicago, Ill.

**OILERS**

Jas. A. Murphy & Co., Hamilton, O.
North American Mfg. Co., 2910 E. 75th St., Cleveland, O.

**OPTICAL PYROMETERS**

Adolph I. Buehler, 228 N. LaSalle St., Chicago, Ill.

**OVENS (Annealing and Heat Treating)**

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland, O.
Dempsey Industrial Furnace Co., Springfield, Mass.
Despatch Oven Co., Minneapolis, Minn.

**OVENS (Annealing and Heat Treating) (Cont'd.)**

Electric Furnace Co., Salem, O.
Foundry Equipment Co., Cleveland, O.
Lindberg Engineering Co., 2448 West Hubbard, Chicago, Ill.
Maehler, Paul, Co., 2200 W. Lake St., Chicago, Ill.
Mahr Mfg. Co., Div. of Diamond Iron Works Inc., Dept. F8, Minneapolis, Minn.
Ross, J. O., Engineering Corp., 350 Madison Ave., New York
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.
Young Brothers Co., 6508 Mack Ave., Detroit, Mich.

**OVENS (Core) (See CORE OVENS)**

**OVENS (Enameling, Japanning)**

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland, O.
Despatch Oven Co., Minneapolis, Minn.
Electric Furnace Co., Salem, O.
Maehler, Paul, Co., 2200 W. Lake St., Chicago, Ill.
R. C. Mahon Co., 8650 Mt. Elliott Ave., Detroit, Mich.
Porbeck Mfg. Co., 2600 N. 9th St., St. Louis, Mo.
Ross, J. O., Engineering Corp., 350 Madison Ave., New York
Young Brothers Co., 6508 Mack Ave., Detroit, Mich.

**OVENS (Mold)**

Despatch Oven Co., Minneapolis, Minn.

**OXYGEN**

Air Reduction Sales Co., 60 East 42nd St., New York, N. Y.

**PARTING COMPOUNDS**

Buckeye Products Co., 7022 Vine St., Cincinnati, O.
Delta Oil Products Co., Milwaukee, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland, O.
National Gypsum Co., Buffalo, N. Y.
Smith Facing & Supply Co., 1857 Carter Rd., Cleveland, O.
Frederic B. Stevens, Inc., Detroit, Mich.
Tamms Silica Co., 228 N. LaSalle St., Chicago, Ill.

**PATTERN COMPOUND**

Tamms Silica Co., 228 N. LaSalle St., Chicago, Ill.

**PATTERN LETTERS**

Freeman Supply Co., Toledo, O.

**PATTERN LUMBER**

Dougherty Lumber Co., Cleveland, O.
Freeman Supply Co., Toledo, O.
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland, O.
Reitz Lumber Co., 1800 N. Central Park Ave., Chicago, Ill.
Thomas & Proetz Lumber Co., 3400 N. Hall St., St. Louis, Mo.

**PATTERN METAL**

River Smelting & Refining Co., 4195 Bradley, Cleveland, O.

**PATTERN PLATES**

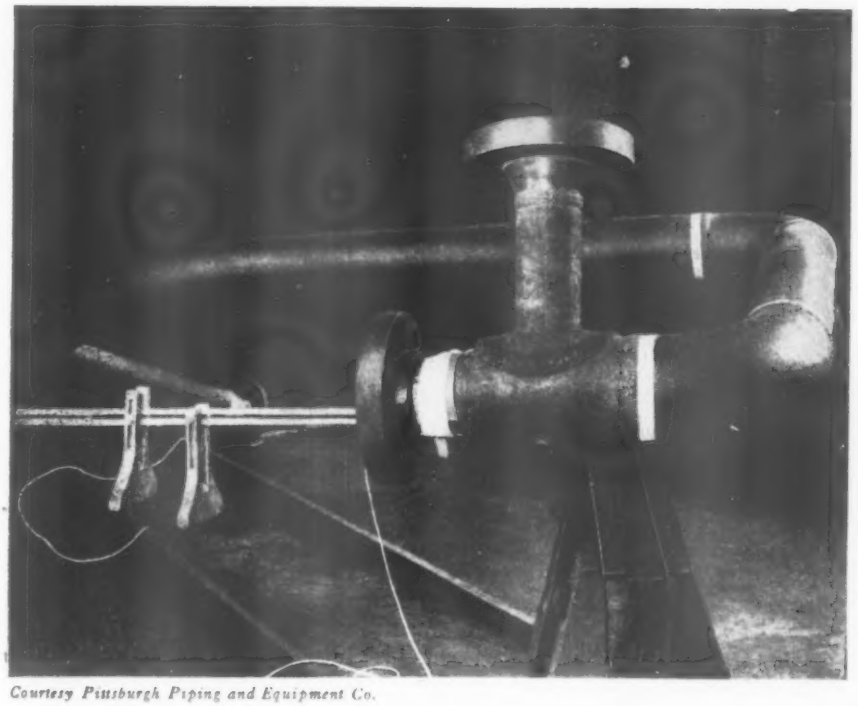
Acme Pattern & Tool Co., Inc., 232 N. Findlay St., Dayton, O.
City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit, Mich.
Freeman Supply Co., Toledo, O.
Hines Mfg. Co., 1324 Hird Ave., Cleveland, O.
Marathon Chemical Co., Div., Marathon Paper Mills Co., Rothschild, Wis.
Moltrup Steel Products Co., Beaver Falls, Pa.
Plaster Process Castings Co., 6922 Carnegie Ave., Cleveland, O.
Scientific Cast Products Corp., 1388-92 E. 40th St., Cleveland, O.

**PATTERN PLATE STOCK**

Freeman Supply Co., 1152 Broadway Toledo, Ohio.
Marathon Chemical Co., Div., Marathon Paper Mills Co., Rothschild, Wis.

*—When writing advertisers, please mention* THE FOUNDRY—

# RADIUM *for* INDUSTRIAL RADIOGRAPHY



*Courtesy Pittsburgh Piping and Equipment Co.*

The illustration shows radium being used to take a radium-radiograph of a weld. Placing the radium centrally in the pipe and the film on the outside permits of taking a radiograph of the enti.e circumferential weld with one exposure. This is just one of the many advantages of the use of radium for industrial radiography.

RADIUM MAY BE PURCHASED OR RENTED BY THE DAY, MONTH OR YEAR.

**WRITE FOR DETAILS**

*Pioneers in the Use of Radium for Industrial Radiography*

**RADIUM CHEMICAL COMPANY, INC.** • 570 Lexington Ave., New York (22), N. Y. • Chicago: Marshall Field Annex Bldg.

# SEMI-STEEL

## IS THE LINK

between iron and steel—is 25 to 60% stronger—no blow holes, sponginess or defects—is clean, close-grained, machines easily, etc. ARE YOU MAKING IT? It stood test since 1902 of few hundred tons to millions now yearly.

COKE SAVINGS WILL BE DEMANDED—are you ready? Get our report on YOUR cupola, the advice is applicable to all shops, concise,—correspondence feature is optional. Get our system of mixing, melting and semi-steel. Synopsis FREE.

**McLAIN'S SYSTEM INC.**

**803 Goldsmith Bldg.** **Milwaukee, Wis.**

# CHAPLETS

## "LEEK-PRUF" SINGLE HEAD

Leakage is definitely eliminated with these BUFFALO single round or square head forged style chaplets because they fuse so readily. A single trial will convince any skeptic.

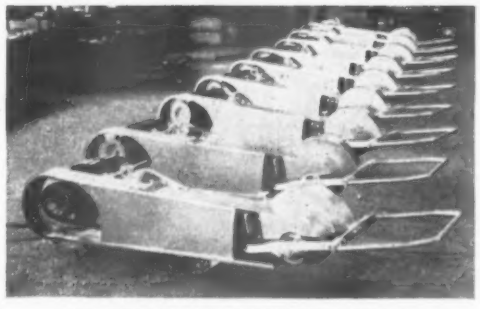
WRITE FOR SAMPLES, PRICES AND DISCOUNTS

COMBINED SUPPLY & EQUIPMENT CO.

215 CHANDLER ST.

BUFFALO, N. Y.

# FOX GRINDERS *become "POST-WAR" as well as "DURATION" assets . . . .*



FOX SWING FRAME AND STAND GRINDERS
"BUILT FOR ROUND-THE-CLOCK DUTY"

The ruggedness engineered into these FOX GRINDERS assures that after months of "round-the-clock" performance in hard-pressed foundries throughout the country, the production of peace-time products will find them still efficiently performing their grinding duties. Write for complete information. Prompt shipment is assured.

**FOX GRINDERS, INC.**

OLIVER BUILDING • PITTSBURGH, PA., U. S. A.

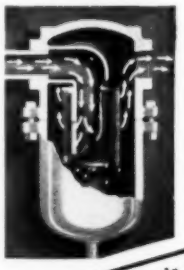
MAKES *Compressed Air* COME CLEAN

THE JOHNSON GAST *2-way* SEPARATOR

WATER, dirt and oil in compressed air lines can be a big source of trouble and expense—causing imperfect results, and deteriorating air hoses and equipment rapidly.

The Johnson-Gast Separator is the simplest way to make your compressed air come clean. It takes out more than 99% of all troublesome foreign elements, because it employs *both* of the accepted principles of separation—expansion and change of direction. The illustration shows its simple, sturdy construction. It can be used with equal efficiency on steam lines also.

When moisture in the air is vaporized by heat generated during compression, the Johnson-Gast Aftercooler is used to condense all vapor so the Separator can remove it. Where every final trace of oil must be removed—as in paint spraying—the Johnson-Gast Oil Absorber is also used.



1. Air first expands, precipitating most of moisture.
2. "Thousand Baffles," labyrinth of wire mesh, changes flow direction — captures remaining water and dirt.

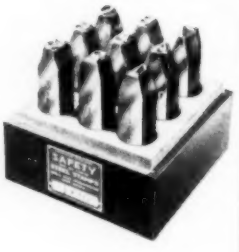
**Write for bulletin showing sizes and capacities of the complete Johnson-Gast line of separating devices.**

THE JOHNSON CORPORATION
870 Wood Street, Three Rivers, Mich.

JOHNSON-GAST
SEPARATORS • AFTERCOOLERS • OIL ABSORBERS

HEAVY BEVEL SAFETY
(Reg. Trade Mark)
LETTERS and FIGURES

Deeper, clean impressions. Will not spall, will not mushroom. Any size character from 1/32" up.



IMMEDIATE DELIVERY
*Write for data!*

M.E. CUNNINGHAM CO.
SAFETY STEEL STAMPS
97 E. Carson St. Pittsburgh 19, Pa.

CHAMPION MOLDERS BENCH

Furnished with or without vibrator

THE WESTERN TOOL & MFG. CO., SPRINGFIELD, OHIO

## WHERE-TO-BUY

**PATTERN SHOP EQUIPMENT**
Buss Machine Works, 8th & Washington Sts., Holland, Mich.
Chicago Wheel & Mfg. Co., Dept. FD, 1101 W. Monroe, Chicago, Ill.
Delta Mfg. Co., Industrial Division, 620 E. Vienna Ave., Milwaukee, Wis.
Freeman Supply Co., Toledo, O.
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland, O.
Oliver Machinery Company, Grand Rapids, Mich.
N. A. Strand Co., 5001 N. Wolcott Ave., Chicago, Ill.

**PATTERN SHOP SUPPLIES**
Chicago Wheel & Mfg. Co., Dept. FD, 1101 W. Monroe, Chicago, Ill.
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland, O.

**PATTERNS (Wood, Metal)**
Acme Pattern & Tool Co., Inc., 232 N. Findlay St., Dayton, O.
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago, Ill.
City Pattern Foundry & Machine Co., 1161 Harper Ave., Detroit, Mich.
Hines Mfg. Co., 1324 Hird Ave., Cleveland, O.
S P O Incorporated, 7500 Grand Division Ave., Cleveland, O.

**PETROLEUM COKE**
Republic Coal & Coke Co., 8 S. Michigan Ave., Chicago, Ill.

**PHOTOGRAPHIC EQUIPMENT**
General Electric X-Ray Corp., Dept. N 37, 2012 Jackson Blvd., Chicago, Ill.

**PIG IRON**
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh, Pa.
E. & G. Brooke Iron Co., Birdsboro, Pa.
Globe Iron Co., Jackson, O.
Hanna Furnace Co., Div. of National Steel Corp., Ecorse, Detroit, Mich.
Hickman-Williams & Co., Cleveland, O.
Pickands, Mather & Co., Cleveland, O.
Republic Steel Corporation, Cleveland, O.
Woodward Iron Co., Woodward, Ala.

**PIG IRON (Silvery)**
Bethlehem Steel Co., Bethlehem, Pa.
Globe Iron Co., Jackson, O.
Jackson Iron & Steel Co., Jackson, O.

**PINS (Flask)**
Hines Mfg. Co., 1324 Hird Ave., Cleveland, O.
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland, O.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee, Wis.

**PISTON RINGS (for Molding Machines, Compressors, etc.)**
Wm. H. Nicholls Co., Richmond Hill, Long Island, N. Y.

**PLASTIC METAL**
Tamms Silica Co., 228 N. LaSalle St., Chicago, Ill.

**PLATES (Bottom)**
Adams Co., 700 Foster St., Dubuque, Iowa.
Moltrup Steel Products Co., Beaver Falls, Pa.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee, Wis.

**PLATES (Core Drying)**
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago, Ill.
Johns-Manville, 22 East 40th St., New York City.

**PLUMBAGO**
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland, O.
J. S. McCormick Co., 25th St. & A.V.R.R., Pittsburgh, Pa.
Frederic B. Stevens, Inc., Detroit, Mich.
United States Graphite Co., Saginaw, Mich.

**PNEUMATIC TOOLS**
Chicago Pneumatic Tool Co., General Offices: 8 East 44th St., New York.
Cleveland Pneumatic Tool Co., 3781 East 77th St., Cleveland, O.
Gardner-Denver Co., Gardner Drive, Quincy, Ill.
Ingersoll-Rand Co., 11 Broadway, New York, N. Y.

**PNEUMATIC TOOLS (Cont'd.)**
Schramm Inc., West Chester, Pa.

**POLISHING MACHINERY**
Chicago Wheel & Mfg. Co., Dept. FD, 1101 W. Monroe, Chicago, Ill.
Hammond Machinery Builders, 1605 Douglas Ave., Kalamazoo, Mich.
N. A. Strand Co., 5001 N. Wolcott Ave., Chicago, Ill.

**POURING DEVICES**
Modern Equipment Co., Dept. 199, Port Washington, Wis.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

**POWDERED COAL EQUIPMENT**
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

**PRESSER BOARDS**
Adams Co., 700 Foster St., Dubuque, Iowa.

**PRESSURE CASTING SEALER**
Empire Varnish Co., 2636 E. 76th St., Cleveland, O.

**PROTECTIVE MATERIALS (X-Ray)**
Picker X-Ray Corp., 300 Fourth Ave., New York City.

**PULLEYS (Magnetic)**
Dings Magnetic Separator Co., 512 E. Smith St., Milwaukee, Wis.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee, Wis.

**PUMPS**
Gardner-Denver Co., Gardner Drive, Quincy, Ill.
Construction Machinery Co., Waterloo, Iowa.
Worthington Pump & Machinery Corp., Harrison, N. J.

**PUMPS (Dry, Vacuum)**
Fuller Company, Catasaqua, Pa.

**PURIFIERS**
Cleveland Flux Co., 1026 Main St., Cleveland, O.

**PUSH-OFF MACHINES**
Champion Foundry & Machine Co., 1314 West 21st St., Chicago, Ill.
International Molding Machine Co., 2608 W. 16th St., Chicago, Ill.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.
Worthington Pump & Machy. Corp., Harrison, N. J.

**PYROMETERS**
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit, Mich.
Illinois Testing Laboratories, Inc., 420 N. LaSalle St., Chicago, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus, O.
Pyrometer Instrument Co., 106 Lafayette St., New York
Tamms Silica Co., 228 N. LaSalle St., Chicago, Ill.

**RADIOGRAPHY (Industrial)**
Canadian Radium & Uranium Corp., Radium Chemical Co. Inc., 630 Fifth Ave., New York City. 570 Lexington Ave., New York, N. Y.

**RADIUM**
Canadian Radium & Uranium Corp., 630 Fifth Ave., New York City.
Radium Chemical Co. Inc., 570 Lexington Ave., New York, N. Y.

**REFRACTORIES**
Carborundum Co., Niagara Falls, N. Y.
Cleveland Quarries Co., Cleveland, Ohio.
Eastern Clay Products, Inc., Elfort, O.
Electro Refractories & Alloys Corp., 62 Andrews Bldg., Buffalo, N. Y.
Fisher Furnace Co., 5535 N. Wolcott Ave., Chicago, Ill.
Haws Refractories Co., Johnstown, Pa.
Ironton Fire Brick Co., Ironton, O.
Norton Co., Worcester, Mass.
Ramtite Company, Div. of S. Obermayer Co., 1803 S. Rockwell St., Chicago, Ill.
Chas. Taylor Sons Co., P.O. Box 58, Annex Sta., Cincinnati, O.
Titanium Alloy Mfg. Co., Niagara Falls, N. Y.
United States Graphite Co., Saginaw, Mich.

**REPAIR PARTS (Molding Machine)**
Pioneer Mfg. Co., West Allis, Wis.

**RESPIRATORS**
Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh, Pa.
Wahlert Products Corp., 25 Lafayette St., Brooklyn, N. Y.

*—When writing advertisers, please mention* THE FOUNDRY—

Castings Cleaned Up Slick as a Whistle

"UTILITY"

MOTOR-IN-HEAD

GRINDERS

Burrs, seams, rough spots all disappear when this great grinder gets busy. For continuous production . . . fast, economical, dependable.

Patented enclosed adjustable wheel guards which save on wheel costs; anti-friction dust-proof bearings; totally enclosed motors; push button starter with overload protection and many other features.

*Model 500—1 to 5 h.p.*
*Reasonably Prompt Deliveries*

THE UNITED STATES ELECTRICAL TOOL CO.

CINCINNATI, OHIO, U.S.A.

IT'S SLAG-PROOF!

a special alloy tube protects this tip!

A thermocouple built to take temperature within the melt and to stand immersion again and again . . . such is the Marshall Enclosed-Tip Thermocouple! It's the new hot-junction tip that does it. This renewable tip is completely enclosed by a tube of special heat-resistant alloy, so no slag nor molten metal can get into it. The Marshall Thermocouple therefore stands constant use and is always ready. It eliminates the use of troublesome open-end, twisted-wire thermocouples.

The Marshall Thermocouple measures temperature of molten brass, bronze, copper, aluminum, magnesium. Gives quick, accurate readings. Furnace and Ladle types for use with stationary or portable pyrometer indicators.

MARSHALL

*Enclosed-Tip*

THERMOCOUPLE

Marshall Enclosed-Tip Thermocouples are the Industry's standard for keeping pouring temperatures just right.




Send for this Folder, or get it from the Pyrometer manufacturer you patronize.

L. H. MARSHALL CO.
272 W. Lane Ave.
Columbus, Ohio

COULAC

(POWDER)

GLUTRIN

(LIQUID)

WRITE TODAY for booklets containing *practical* information regarding the use of these two OUTSTANDING SAND BINDERS

ROBESON PROCESS COMPANY
AMERICAN GUM PRODUCTS COMPANY

*General Offices:*

500 Fifth Ave., New York City

Rawhide HAMMERS MALLETS

Carefully made, accurately balanced, with weighted heads where extra striking power is needed. Strike forceful blows without marring or battering, without recoil or bounce. Never split, chip, "smear" or crack, retain this true striking face so every blow goes right to the target . . . gets work done. Long wearing, mechanically cured, coiled Rawhide faces far outlast soft metals, plastics, wood or rubber.

*Replaceable Heads*

Replaceable Insert Faces are available for C.R. Hammers . . . make each a "lifetime" tool.

CHICAGO Rawhide MFG. CO.

1384 ELSTON AVE.. ★ CHICAGO, ILLINOIS.

BERKSHIRE Jolt Squeeze MOLDING MACHINES

Model H Jolt Squeeze

CANNON AIR VIBRATORS

10" SQUEEZE CYLINDER

4" JOLT CYLINDER

CANNON VIBRATOR CO. • 1111 Power Ave. Cleveland, Ohio • BERKSHIRE MFG. CO.

*Complete Assortments*

PATTERN *and* FLASK LUMBER

*—with emphasis on—*

GENUINE NORTHERN WHITE PINE

RIETZ LUMBER COMPANY

1800 NORTH CENTRAL PARK AVE., CHICAGO, ILL.


## WHERE-TO-BUY

**RIDDLES**
Buffalo Wire Works., 425 Terrace, Buffalo, N. Y.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland, O.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis St., Philadelphia, Pa.

**RIDDLES (Electric)**
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland, O.
Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago, Ill.
Great Western Mfg. Co., Leavenworth, Kans.

**RIDDLES (Hand)**
Buffalo Wire Works Co, 425 Terrace, Buffalo, N. Y.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland, O.

**RIDDLE BOTTOMS (Gyratory)**
Buffalo Wire Works Co., 425 Terrace, Buffalo, N. Y.

**RODS (Steel)**
Republic Steel Corp., Cleveland, O.

**ROD STRAIGHTENER**
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland, O.

**ROLLER-HEARTH FURNACES (Electric Annealing)**
General Electric Co., Schenectady, N. Y.

**RUBBER LINING MATERIAL (Abrasive Resisting)**
Pangborn Corp., Hagerstown, Md.

**RUST PREVENTATIVES**
Penola Inc., Pittsburgh, Pa.

**SAFETY CLOTHING**
American Optical Co., Southbridge, Mass.
Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh, Pa.
Wahlert Products Corp., 25 Lafayette St., Brooklyn, N. Y.

**SALT and SALT TABLETS**
Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh, Pa.
Morton Salt Co., 310 So. Michigan Ave., Chicago, Ill.

**SANDS (Core, Molding, Blasting)**
Great Lakes Foundry Sand Co., United Artists Bldg., Detroit, Mich.
Ottawa Silica Co., Ottawa, Ill.
Pangborn Corp., Hagerstown, Md.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia, Pa.
Producers Core Sand Corp., Michigan City, Ind.
Titanium Alloy Mfg. Co., Niagara Falls, N. Y.

**SAND BLAST BARRELS**
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Dreisbach Engineering Corp., 45 Warburton Ave., Yonkers, N. Y.
Pangborn Corp., Hagerstown, Md.
Parsons Engineering Corp., Cleveland, O.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia, Pa.
W. W. Sly Mfg Co., 4753 Train Ave., Cleveland, O.

**SAND BLAST CABINETS**
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Parsons Engineering Corp., Cleveland, O.

**SAND BLAST EQUIPMENT**
American Air Filter Co., 266 Central Ave., Louisville, Ky.
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Parsons Engineering Corp., Cleveland, O.
Ruemelin Mfg. Co., 3850 North Palmer St., Milwaukee, Wis.

**SAND BLAST EQUIPMENT (Cont'd)**
Tabor Mfg. Co., 6225 Tacony St., Philadelphia, Pa.
W. W. Sly Mfg. Co., 4753 Train St., Cleveland, O.

**SAND BLAST NOZZLES**
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Norton Company, Worcester, Mass.
Pangborn Corp., Hagerstown, Md.
Ruemelin Mfg. Co., 3850 N. Palmer St., Milwaukee, Wis.
Stoody Co., 1139 W. Slauson Ave., Whittier, Calif.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland, O.

**SAND BLAST ROOMS**
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Hydro-Blast Corp., 2550 N. Western Ave., Chicago, Ill.
Pangborn Corp., Hagerstown, Md.
Parsons Engineering Corp., Cleveland, O.
Ruemelin Mfg. Co., 3850 North Palmer St., Milwaukee, Wis.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland, O.

**SAND BLAST TABLES**
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Parsons Engineering Corp., Cleveland, O.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland, O.

**SAND CONTROL and TESTING EQUIPMENT**
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit, Mich.
National Engineering Co., 549 W. Washington St., Chicago, Ill.

**SAND CONVEYING and HANDLING EQUIPMENT**
American Air Filter Co., 266 Central Ave., Louisville, Ky.
C. O. Bartlett & Snow Co., 6201 Harvard Ave., Cleveland, O.
Beardsley & Piper Co., The 2541 N. Keeler Ave., Chicago, Ill.
Clearfield Machine Co., Clearfield, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago, Ill.
National Engineering Co., 549 W. Washington St., Chicago, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.
Penn Iron Works, Reading, Pa.
Royer Foundry & Machine Co., Kingston, Pa.

**SAND CONVEYING and HANDLING EQUIPMENT (Pneumatic)**
Ajax Flexible Coupling Co., Westfield, N. Y.
Fuller Company, Catasaqua, Pa.
Robins Conveyors Inc., Passaic, N. J.

**SAND DRYERS**
C. O. Bartlett & Snow Co., 6201 Harvard Ave., Cleveland, O.
Link Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Pangborn Corp., Hagerstown, Md.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

**SAND MEASURING and WEIGHING DEVICES**
Link Belt Co., 300 W. Pershing Rd., Chicago, Ill.
National Engineering Co., 549 W. Washington St., Chicago, Ill.

**SAND MIXERS**
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Beardsley & Piper Co., The 2541 N. Keeler Ave., Chicago, Ill.
Blystone Division Standard Sand & Machine Co., 549 W. Washington Blvd., Chicago, Ill.
Clearfield Machine Co., Clearfield, Pa.
Construction Machinery Corp., Waterloo, Iowa
Freeman Supply Co., 1152 Broadway Toledo, Ohio.
Link Belt Co., 300 W. Pershing Rd., Chicago, Ill.
National Engineering Co., 549 W. Washington St., Chicago, Ill.
Royer Foundry & Machine Co., Kingston, Pa.

*When writing advertisers, please mention* THE FOUNDRY

# TAKING ON ANOTHER BIG JOB

"CERTIFIED" STEEL ABRASIVES ADD PEENING TO THEIR MANY OUTSTANDING ACCOMPLISHMENTS.

A new field is rapidly developing for one of the "CERTIFIED" twins. Sansom Steel Shot is picked by industry to help lengthen the *fatigue life* of important metal parts—by *peening*. You'll hear more about this soon—and when you do—you'll know that "CERTIFIED" Steel Abrasives had an important part to play in this revolutionary treatment of metals.

**PITTSBURGH CRUSHED STEEL CO.**
PITTSBURGH, PENNA.

**STEEL SHOT AND GRIT CO.**
BOSTON, MASS.

BESSEMER FERRO-SILICONS

**GLOBE IRON COMPANY**

JACKSON
OHIO
JACKSON COUNTY
SILVERIES

SPECIAL HIGH SILICON GRADES

**FOUNDED 1872**

One Week to 10 Days

**IMMEDIATE DELIVERY**

**General Centrifugal Blowers**

*Designed for* GAS *and* OIL BURNERS,
CORE *and* ANNEALING OVENS,
CUPOLAS *and* CRUCIBLE FURNACES

★
**Gas Boosters**
★
**Cupola Blowers**
WIDE RANGE OF SIZES
FOR EVERY REQUIREMENT
★

*Send for NEW 8-Page Bulletin CB-101*

**GENERAL BLOWER COMPANY**
406 N. PEORIA ST.—MONROE 0244—CHICAGO, ILL.

120 Liberty St.
New York, N. Y.

7644 Woodward Ave.
Detroit, Michigan

1084 Lakeland Ave.
Cleveland, O.

430 Frick Bldg.
Pittsburgh, Pa.

P. O. Box 5010
Fox Chase, Phila., Pa.

# HARVEST TIME IS NOW!

"RAKE IN" extra profits by using PANGBORN-NORBIDE* "Long-Wear" Blast Cleaning NOZZLES. No other guarantee even approaches this—1500 hours with steel abrasive and 750 hours with sand.

*Trade Mark of Norton Co. for Boron Carbide

**PANGBORN CORPORATION**

The World's Largest Manufacturer of Blast Cleaning and Dust Collecting Equipment

HAGERSTOWN · · · · MARYLAND

**A. A. WICKLAND & CO.**

*Foundry Engineers*

*Continuously Since 1919*

Designers of modern foundries and manufacturing plants.

Complete engineering service.

Clients of national prominence will attest to our ability.

**ENGINEERING BUILDING · CHICAGO**

*Telephone Dearborn 9344*

THE JACKSON IRON & STEEL COMPANY

*Manufacturers of*

**"JISCO"**

SILVERY PIG IRON SPECIALTIES

JACKSON OHIO


## WHERE-TO-BUY

**SAND PREPARATION EQUIPMENT**
Ajax Flexible Coupling Co., Westfield, N. Y.
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
C. O. Bartlett & Snow Co., 6201 Harvard Ave., Cleveland, O.
Beardsley & Piper Co., The, 2541 N. Keeler Ave., Chicago, Ill.
Clearfield Machine Co., Clearfield, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago, Ill.
National Engineering Co., 549 W. Washington St., Chicago, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.
Royer Foundry & Machine Co., Kingston, Pa.
Simplicity Engineering Co., Durand, Mich.

**SAND RAMMERS**
Chicago Pneumatic Tool Co., General Offices: 8 East 44th St., New York.
Cleveland Pneumatic Tool Co., 3781 East 77th St., Cleveland, O.
Dayton Pneumatic Tool Co., Dayton, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh, Pa.

**SAND RECLAIMERS**
Hydro-Blast Corp., 2550 N. Western Ave., Chicago, Ill.
National Engineering Co., 549 W. Washington St., Chicago, Ill.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee, Wis.

**SAND SIFTING and SCREENING MACHINERY**
American Air Filter Co., 266 Central Ave., Louisville, Ky.
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland, O.
Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago, Ill.
Great Western Mfg. Co., Leavenworth, Kansas.
Link Belt Co., 300 W. Pershing Rd., Chicago, Ill.
National Engineering Co., 549 W. Washington St., Chicago, Ill.
Royer Foundry & Machine Co., Kingston, Pa.

**SAND STORAGE BINS & GATES**
Beardsley & Piper Co., The, 2541 N. Keeler Ave., Chicago, Ill.
Link Belt Co., 300 W. Pershing Rd., Chicago, Ill.
National Engineering Co., 549 W. Washington St., Chicago, Ill.
Neff & Fry, Camden, O.

**SANDING MACHINERY**
Delta Mfg. Co., Industrial division, 620 E. Vienna Ave., Milwaukee, Wis.
Oliver Machinery Company, Grand Rapids, Mich.

**SAW (Band, Metal, Wood)**
Delta Mfg. Co., Industrial division, 620 E. Vienna Ave., Milwaukee, Wis.
Oliver Machinery Company, Grand Rapids, Mich.

**SAWS (Cold Metal)**
Bethlehem Steel Co., Bethlehem, Pa.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia, Pa.

**SCALES**
Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.

**SCALING HAMMERS**
Dayton Pneumatic Tool Co., Dayton, O.
Schramm Inc., West Chester, Pa.

**SCHOOLS (Correspondence)**
McLain's System, Inc., Goldsmith Bldg., Milwaukee, Wis.

**SCREENS (Shake-Out)**
C. O. Bartlett & Snow Co., 6201 Harvard Ave., Cleveland, O.
Beardsley & Piper Co., The, 2541 N. Keeler Ave., Chicago, Ill.
National Engineering Co., 549 W. Washington St., Chicago, Ill.
Simplicity Engineering Co., Durand, Mich.

**SCREENS (Sifting)**
Buffalo Wire Works Co., 425 Terrace, Buffalo, N. Y.

**SCREENS (Vibrating)**
Ajax Flexible Coupling Co., Westfield, N. Y.
Robins Conveyors Inc., Passaic, N. J.

**SEA COAL**
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland, O.
Smith Facing & Supply Co., 1857 Carter Rd., Cleveland, O.
Frederic B. Stevens, Inc., Detroit, Mich.

**SEPARATORS (Abrasive)**
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Parsons Engineering Corp., Cleveland, O.

**SEPARATORS (Air, Moisture, Oil)**
American Air Filter Co., 266 Central Ave., Louisville, Ky.
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Johnson Corporation, Three Rivers, Mich.
Jas. A. Murphy & Co., Hamilton, Ohio.
Pangborn Corp., Hagerstown, Md.
Claude B. Schneible Co., 3953 Lawrence Ave., Chicago, Ill.

**SEPARATORS (Magnetic)**
Ajax Flexible Coupling Co., Westfield, N. Y.
Beardsley & Piper Co., The 2541 N. Keeler Ave., Chicago, Ill.
Dings Magnetic Separator Co., 512 E. Smith St., Milwaukee, Wis.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee, Wis.

**SERVICE and TRAINING MANUALS**
Elliott Service Co., 219 E. 44th St., New York City.

**SHAKE-OUT MACHINERY**
Ajax Flexible Coupling Co., Westfield, N. Y.
American Air Filter Co., 266 Central Ave., Louisville, Ky.
C. O. Bartlett & Snow Co., 6201 Harvard Ave., Cleveland, O.
Beardsley & Piper Co., The, 2541 N. Keeler Ave., Chicago, Ill.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago, Ill.
New Haven Vibrator Co., 131 Chestnut St., New Haven, Conn.
Robins Conveyors Inc., Passaic, N. J.
Royer Foundry & Machine Co., Kingston, Pa.
Simplicity Engineering Co., Durand, Mich.

**SHIMMINGS MILL (Grinding and Washing)**
Dreisbach Engineering Corp., 45 Warburton Ave., Yonkers, N. Y.

**SHOT and GRIT**
Alloy Metal Abrasive Co., 311 W. Huron St., Ann Arbor, Mich.
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
American Steel Abrasives Co., Galion, O.
Dreisbach Engineering Corp., 45 Warburton Ave., Yonkers, N. Y.
Globe Steel Abrasive Co., Mansfield, O.
Great Lakes Foundry Sand Co., United Artists Bldg., Detroit, Mich.
Hickman-Williams & Co., Cleveland, O.
Pangborn Corp., Hagerstown, Md.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia, Pa.
Pittsburgh Crushed Steel Co., Pittsburgh, Pa.
Parsons Engineering Corp., Cleveland, O.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland, O.
Steel Shot & Grit Co. Inc., 39 Warren Ave., Boston, Mass.

**SHOVELS**
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland, O.
Frederic B. Stevens, Inc., Detroit, Mich.

**SILICA FLOUR**
Ottawa Silica Co., Ottawa, Ill.

**SILICON (Briquets)**
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York, N. Y.

**SILICON CARBIDE (Briquets)**
Carborundum Co., Niagara Falls, N. Y.

**SKIMMER BARS**
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago, Ill.

—*When writing advertisers, please mention* THE FOUNDRY—

# SAVE POWER BETWEEN JOBS WITH A Mall TRADE MARK GRINDER

***You Shut Off The Power When You Stop The Tool**

No power is wasted between metal cleaning and finishing operations when you use this electrically driven MALL Geared-Head Grinder, that operates independently of all other tools.

Easily rolled right up to the work, it saves many steps for the operator, reduces material handling and increases production. In addition, the constant high working speed lengthens tool life, cuts rejects and improves every application.

The quickly interchangeable attachments for Grinding, Disc Sanding, Wire Brushing, Polishing and Drilling are free from motor weight and easy to handle. Operates on 110-220 or 220-440-volt, 3 phase, 60-cycle current and delivers 3450 r.p.m. to the working tool. Geared head steps up speed to 4500 r.p.m. under load. Available for Victory Production with caster base or overhead trolley mounting. Other models ¾ to 3 H.P. Full details upon request.

**MALL TOOL COMPANY**
7720 SOUTH CHICAGO AVE. CHICAGO 19, ILL.



*Exceptional Opportunity for*

**ENGINEER-SUPERINTENDENT**

Old manufacturing concern, located in medium size mid-west city with splendid living conditions is operating new and growing permanent mold aluminum foundry equipped with heat treating facilities, x-ray and laboratory control. Has permanent opening of opportunity for man preferably with engineering training who has had practical experience in permanent mold and sand cast aluminum. Should be familiar with melting practice, alloying, mold design and the usual sand casting procedure. Should be able to handle workmen and cooperate closely with management.

**Address Box 233—The Foundry—Cleveland, Ohio**



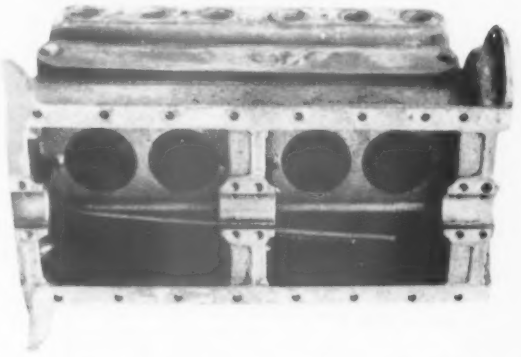
# BOOKS

**On Metallurgy, Iron and Steel Practice, Foundry Work, etc.**

We specialize in books of interest to our readers, and will be glad to advise you about the best book for your particular needs.

**THE FOUNDRY**
**Penton Building** *Book Dept.* **Cleveland, Ohio**





# THIS CASTING CAN BE

(IMPREGNATED WITH WATERLOX)

# SAVED

Waterlox Transparent is an approved casting sealer and is serving the Armed Forces on all battle fronts. Many manufacturers have used Waterlox to impregnate cylinder heads and blocks, pumps, and other engine castings for use on marine engines, tanks, planes and other mobile units.

Waterlox Transparent, as a sealer, has hastened production by eliminating the waste from scrapping un-necessarily "leaky" or "weeping" castings. It is an economical process and the savings in labor and time is astounding.

Cylinder blocks sealed with Waterlox are less likely to score from loosened particles of sand under the effects of hot oil. Centrifugal pumps can be effectively impregnated with Waterlox for better wear and longer service, without wastage in the manufacture.

Write for specifications and assistance in obtaining government approval for the use of Waterlox Transparent on your product.

**WATERLOX**
DIVISION OF
**THE EMPIRE VARNISH COMPANY**
2636 East 76th St. Cleveland, Ohio

NATIONAL STEEL

# Hanna Pig Iron

THE BEST KNOWN NAME IN IRON

GRADES:
Basic
Foundry • Silvery
Malleable
Ferro-Silicon

BRANDS:
Buffalo • Detroit
Susquehanna

The Hanna Furnace Corporation
MERCHANT PIG IRON DIVISION OF
NATIONAL STEEL CORPORATION
Buffalo, Detroit, New York, Philadelphia, Boston

*For Better Blown Cores, Use*
## DEMMLER CORE BOX VENTS

PERFORATED VENTS
No. 00, No. 0, No. 1
or No. 2 holes

SLOTTED VENTS
Brass or Steel
Slots .010" to .015"

**WM. DEMMLER & BROS.**
Kewanee - Illinois

## THE WORK OF TEN MEN FOR 8c PER DAY

Type "V"

This low priced, easily handled, type "V" Combs Gyratory Riddle really turns out the work and at the same time saves man power. Only 5 feet over all it is easily portable for one man and the 20-inch diameter sieve can be removed and replaced in 5 seconds. Send for our catalog and select the type of riddle you require. Prompt shipment is assured.

**$175** *COMPLETE, READY TO OPERATE.*

**GREAT WESTERN MFG. CO.**
(NOT INC.)
Leavenworth, Kansas


## WHERE-TO-BUY

**SKIMMERS**
Tamms Silica Co.,
228 N. LaSalle St., Chicago, Ill.

**SKIP HOISTS**
Beardsley & Piper Co., The,
2541 N. Keeler Ave., Chicago, Ill.
Gardner-Denver Co.,
Gardner Drive, Quincy, Ill.
National Engineering Co., 549 W.
Washington St., Chicago, Ill.
Whiting Corp.,
15607 Lathrop Ave., Harvey, Ill.

**SLIP FLASKS**
Adams Co., 700 Foster St.,
Dubuque, Iowa.
Hines Mfg. Co., 1324 Hird Ave.,
Cleveland, Ohio

**SLIP JACKETS**
Adams Co., 700 Foster St.,
Dubuque, Ia.,
American Foundry Equipment Co.,
505 S. Byrkit St., Mishawaka, Ind.
Chicago Mfg. & Distributing Co.,
1928 W. 46th St., Chicago, Ill.
Federal Foundry Supply Co.,
4600 E. 71st St., Cleveland, O.
Freeman Supply Co.,
1152 Broadway
Toledo, Ohio.
Fremont Flask Co., Fremont, O.
Hines Mfg. Co., 1324 Hird
Ave., Cleveland, O.

**SMELTERS & REFINERS**
American Smelting & Refining Co.,
120 Broadway, New York
Bohn Aluminum & Brass Corp.,
1400 Lafayette Bldg.,
Detroit, Mich.
River Smelting & Refining Co.,
4195 Bradley, Cleveland, O.

**SNAGGING WHEELS—See ABRASIVE WHEELS**

**SNAP FLASKS**
Adams Co., 700 Foster St.,
Dubuque, Ia.
American Foundry Equipment Co.,
505 S. Byrkit St., Mishawaka, Ind.

**SODA ASH**
Hercules Powder Co.,
999 Market St., Wilmington, Del.
Great Lakes Foundry Sand Co.,
United Artists Bldg., Detroit, Mich.
Mathieson Alkali Works, Inc.,
60 E. 42nd St., New York, N. Y.

**SOLDER**
American Smelting & Refining Co.,
120 Broadway, New York

**SPIEGELEISEN**
Electro Metallurgical Sales Corp.,
30 E. 42nd St., New York, N. Y.

**SPRAYERS (Pistol)**
Jas. A. Murphy & Co.,
Hamilton, Ohio.

**SPRAY GUNS**
Jas. A. Murphy & Co.,
Hamilton, Ohio.
New Haven Vibrator Co., 131
Chestnut St., New Haven, Conn.

**SPRUE CUTTERS**
Adams Co., 700 Foster St.,
Dubuque, Iowa.
Freeman Supply Co.,
Toledo, O.
Scully Machinery & Equip. Corp.,
2031 W. 74th St., Chicago, Ill.

**STAMPS & HOLDERS (Steel)**
M. E. Cunningham Co., 97 E. Carson St., Pittsburgh, Pa.

**STARS (Tumbling)**
W. W. Sly Mfg. Co.
4753 Train Ave., Cleveland, O.

**STEEL (High Speed)**
Bethlehem Steel Co.,
Bethlehem, Pa.

**STEEL (Structural)**
American Bridge Co.,
Pittsburgh, Pa.
Bethlehem Steel Co.,
Bethlehem, Pa.

**STEEL WASH**
Dayton Oil Co., Dayton, O.

**STOKERS**
American Engineering Co.,
2418 Aramingo Street,
Philadelphia, Pa.

**STRIPPING MACHINES**
Adams Co., 700 Foster St.,
Dubuque, Iowa.
Champion Foundry & Machine Co.,
1314 West 21st St., Chicago, Ill.
Davenport Machine & Foundry Co.,
Davenport, Iowa.
International Molding Machine Co.,
2608 W. 16th St., Chicago, Ill.

**STRIPPING MACHINES (Cont'd.)**
Milwaukee Foundry Equipment Co.,
3238 W. Pierce St.,
Milwaukee, Wis.

**SURFACE TREATMENT METALS**
N. Ransohoff, Inc., 208 W. 71st St.,
Cincinnati, O.

**TANK TRAPS**
Jas. A. Murphy & Co.,
Hamilton, Ohio.

**TAPER PINS**
Standard Horse Nail Corp.,
New Brighton, Pa.

**TEMPERATURE CONTROLLERS**
Illinois Testing Laboratories,
418 N. LaSalle St., Chicago, Ill.
Marshall Co., L. H., 270 W. Lane,
Columbus, O.

**TESTING LABORATORIES**
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit, Mich.
Chas. C. Kawin Co.,
431 So. Dearborn St., Chicago, Ill.

**TESTING MACHINERY**
Dillon, W. C., & Co. Inc.,
5410 W. Harrison St., Chicago, Ill.
Riehle Testing Machine Div.,
American Machine & Metals Inc.,
East Moline, Ill.

**THERMOCOUPLES**
Illinois Testing Laboratories,
418 N. LaSalle St., Chicago, Ill.
Marshall Co., L. H., 270 W. Lane,
Columbus, O.
Tamms Silica Co.,
228 N. La Salle St., Chicago, Ill.

**TIMERS (Electric)**
Herman Pneumatic Machine Co.,
Union Bank Bldg., Pittsburgh, Pa.

**TIN**
American Smelting & Refining Co.,
120 Broadway, New York
River Smelting & Refining Co.,
4195 Bradley, Cleveland, O.

**TONGS**
Industrial Equipment Co.,
Minster, O.

**TOOLS (Pneumatic, Portable)**
Chicago Pneumatic Tool Co.,
General Offices: 8 East 44th St.,
New York.
Cleveland Pneumatic Tool Co.,
3781 East 77th St., Cleveland, O.
Dayton Pneumatic Tool Co.,
Dayton, O.
Gardner-Denver Co.,
Gardner Drive, Quincy, Ill.
Ingersoll-Rand Co.,
11 Broadway, New York, N. Y.
Schramm Inc., West Chester, Pa.

**TORCHES and BURNERS (Acetylene, gas, oil)**
Freeman Supply Co.,
Toledo, O.
Kindt-Collins Co., 12653 Elmwood
Ave., Cleveland, O.
North American Mfg. Co.,
2910 E. 75th St., Cleveland, O.

**TRACTORS (Gas Powered)**
Clark Tructractor Div. of
Clark Equipment Co.,
Battle Creek, Mich.

**TRAILERS (Dump)**
Electric Wheel Co., Quincy, Ill.

**TRAILERS (Platform)**
Electric Wheel Co., Quincy, Ill.

**TRAMRAIL SYSTEMS**
American MonoRail Co.,
13104 Athens Ave., Cleveland, O.
Chicago Tramrail Co., 2910 Carroll
Ave., Chicago, Ill.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co.,
1155 East 283rd St., Wickliffe, O.
Modern Equipment Co., Dept. 199
Port Washington, Wis.

**TRAPS (Steam)**
Johnson Corporation,
Three Rivers, Mich.

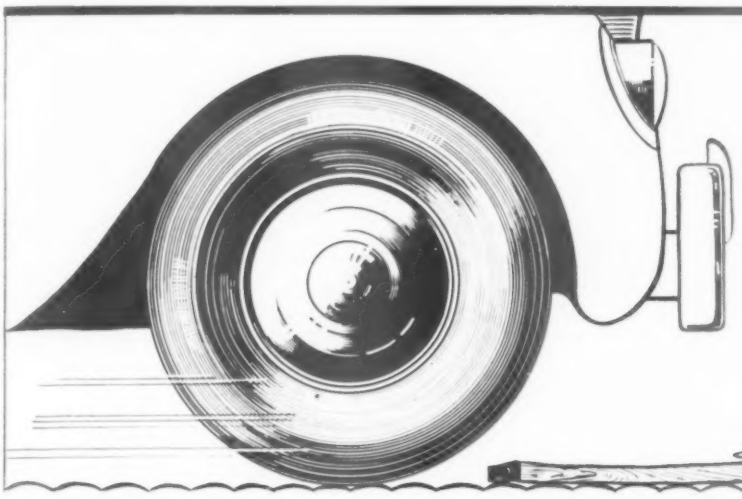
**TROLLEYS**
Curtis Pneumatic Machinery Co.,
1922 Kienlen Ave., St. Louis, Mo.
Modern Equipment Co., Dept. 199
Port Washington, Wis.

**TRUCK CRANES**
Automatic Transportation Co.,
121 West 87th St., Chicago, Ill.

**TRUCKS (Electric-Industrial)**
Automatic Transportation Co.,
121 West 87th St.,
Chicago, Ill.

**TRUCKS (Power Lift)**
Automatic Transportation Co.,
121 West 87th St.,
Chicago, Ill.
Clark Tructractor Div. of
Clark Equipment Co.,
Battle Creek, Mich.

*—When writing advertisers, please mention* THE FOUNDRY *—*



# YOU CAN EXPECT FREE AND RAPID VENTING . . .

*. . . when you use Buffalo Brand Vent Wax in your cores. Good venting saves countless cores and helps guarantee castings . . . and the cost of* **BUFFALO BRAND VENT WAX** *is so low (a few pennies per casting) no foundry can afford to be without it. Ask your dealer, or write to us for samples.*

## UNITED COMPOUND CO.

BUFFALO, N. Y.

# PENN DUMPING BUCKETS

No. 5-A

Careful balancing makes Penn Buckets self dumping when loaded and self righting when empty. Careful construction prevents "clinging" makes them easily emptied.

**WRITE TODAY FOR NEW BULLETIN DIMENSION SHEET AND PRICE LIST**

## PENN IRON WORKS

READING, PENNA.

## INDEPENDENCE . . . *at 25¢ on the $1.00*

● WORLD FREEDOM is the victory for which America and her Allies are fighting today with all their resources. But we're speaking of a different type of independence—an industrial variety. In other words, Mr. Welder, with Sight Feed YOU don't have to rely on a "bottler" for acetylene. Just generate all you want when you want it. Thriftily, too . . . for "25c on the $1.00" reflects the experience of countless Sight Feed users whose acetylene costs have been CUT as much as 75%.

**THE SIGHT FEED GENERATOR CO.**
Sales: Richmond, Indiana
Factory: W. Alexandria, Ohio

## 300 to 600 Hours
## BLAST CLEANING SERVICE from every BORIUM NOZZLE

Ordinary cast iron blast cleaning nozzles last but a few hours at most...require frequent changing...waste air and lose their cleaning efficiency in a short time.

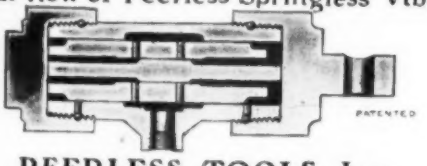
Because Stoody's Borium Nozzles are lined with tungsten carbide, the hardest, most wear-resistant commercial metal ever developed, they are *guaranteed for 300 hours' operation*—frequently last as long as 600 hours! Borium Nozzles eliminate frequent nozzle changes, save compressor wear, and maintain original, efficient spray pattern. Long life and high cleaning efficiency reduce Borium Nozzle costs to as little as 2½c per hour!

For more information on Stoody's BORIUM NOZZLES, write for free booklet, *Borium Nozzles Cut Blast Cleaning Costs!*

**STOODY COMPANY** 1139 West Slauson Ave., Whittier, Calif.

**STOODY HARD-FACING ALLOYS**
*Stop wear... Eliminate Repair*

Sectional view of Peerless Springless Vibrators




PEERLESS TOOLS, Inc.
MILFORD, CONN. U.S.A.

## HARDWOOD WEDGES

Immediate shipment out of stock on most regular sizes.
*Write for prices—*
We make ALL TYPES of hardwood wedges!
**HALEY MFG. CO., CENTERVILLE, IND.**

**PRODUCERS CORE SAND CORPORATION**
PITS AT MICHIGAN CITY, INDIANA AND SAWYER, MICHIGAN
MICHIGAN CITY, INDIANA

**ELEMENTARY FOUNDRY TECHNOLOGY**
*Edited and Revised by* Edwin Bremer and Pat Dwyer
This completely revised third edition, is a text designed primarily for foundry apprentices and practical students of foundry operations. 975 pages, 6 x 9—Index—132 Illustrations—16 tables. *Price* $3.00 *Postpaid.*
**THE PENTON PUBLISHING COMPANY**
**Penton Building — Book Department — Cleveland, Ohio**
555-F


## WHERE-TO-BUY

**TRUCK WHEELS**
Automatic Transportation Co., 121 West 87th St., Chicago, Ill.
Bethlehem Steel Co., Bethlehem, Pa.
French & Hecht, 523 East 3rd St., Davenport, Iowa.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee, Wis.

**TUBES (X-Ray)**
Picker X-Ray Corp., 300 Fourth Ave., New York City.

**TUMBLING BARRELS**
Cleveland Chaplet & Mfg. Co., 1197 West 67th St., Cleveland, O.
N. Ransohoff Inc., 208 W. 71st St., Cincinnati, O.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland, O.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia, Pa.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

**TURNTABLES**
Beardsley & Piper Co., The, 2541 N. Keeler Ave., Chicago, Ill.
Modern Equipment Co., Dept. 199, Port Washington, Wis.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

**VALVES, AIR**
New Haven Vibrator Co., 131 Chestnut St., New Haven, Conn.

**VALVES (Air, Water, Steam)**
Air-Way Pump & Equipment Co., 405 S. Jefferson St., Chicago, Ill.
Galland-Henning Mfg. Co., 2750 So. 31st St., Milwaukee, Wis.
North American Mfg. Co., 2910 E. 75th St., Cleveland, O.

**VALVES (Adjustable Orifice)**
North American Mfg. Co., 2910 E. 75th St., Cleveland, O.

**VALVES (Blow-off and Cut-off)**
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago, Ill.
Wm. H. Nicholls Co., Richmond Hill, Long Island, N. Y.

**VENTILATING SYSTEMS**
American Foundry Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Claude B. Schneible Co., 3953 Lawrence Ave., Chicago, Ill.
DeBothezat Ventilating Equip. Div., American Machine & Metals Co., East Moline, Ill.
Pangborn Corp., Hagerstown, Md.
Parsons Engineering Corp., Cleveland, O.
Peters-Dalton Inc., 628 E. Forest Ave., Detroit, Mich.
Ross, J. O., Engineering Corp., 350 Madison Ave., New York
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland, Ohio.
B. F. Sturtevant Co., Hyde Park, Boston, Mass.

**VENTS (Core Box)**
Wm. Demmler & Bros., Kewanee, Ill.,
C. M. Smillie & Co., 1100 Woodward Hgts. Blvd., Ferndale, Mich.

**VIBRATORS**
Adams Co., 700 Foster St., Dubuque, Iowa.
Beardsley & Piper Co., The, 2541 N. Keeler Ave., Chicago, Ill.
Cannon Vibrator Co., 1111 Power Ave., Cleveland, O.
Davenport Machine & Foundry Co., Davenport, Iowa.
Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago, Ill.
Freeman Supply Co., 1152 Broadway Toledo, Ohio.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh, Pa.
Link Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.
New Haven Vibrator Co., 131 Chestnut St., New Haven, Conn.
Wm. H. Nicholls Co., Richmond Hill, Long Island, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O.
Peerless Tools Inc., Milford, Conn.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis St., Philadelphia, Pa.
S P O Incorporated, 7500 Grand Division Ave., Cleveland, O.
Syntron Company, Homer City, Pa.
Tabor Mfg. Co., 6225 Tacony St., Philadelphia, Pa.

**VIBRATORS (Core Bench)**
New Haven Vibrator Co., 131 Chestnut St., New Haven, Conn.

**WAX (Core, Vent, Pattern)**
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland, O.
United Compound Co., Inc., 328 South Park Ave., Buffalo, N. Y.

**WEDGES (Foundry)**
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago, Ill.
Haley Mfg. Co., Centerville, Indiana.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee, Wis.

**WEIGHING DEVICES**
Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.

**WELDING GAS**
Air Reduction Sales Co., 60 East 42nd St., New York, N. Y.

**WELDING (Acetylene Generators)**
Sight Feed Generator Co., Richmond, Ind.

**WELDING APPARATUS (Electric Arc)**
Sight Feed Generator Co., Richmond, Ind.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

**WELDING and CUTTING APPARATUS and SUPPLIES**
Air Reduction Sales Co., 60 East 42nd St., New York, N. Y.

**WELDING ROD**
Air Reduction Sales Co., 60 East 42nd St., New York, N. Y.
Eutectic Welding Alloys Inc., 40 Worth St., New York City.
Stoody Co., 1139 W. Slauson Ave., Whittier, Calif.

**WHEELBARROWS**
Construction Machinery Corp., Waterloo, Iowa
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee, Wis.

**WHEELBARROW WHEELS**
French & Hecht, 523 East 3rd St., Davenport, Iowa.

**WHEELS (Cut-off)**
West Co. Inc., 1117 Shackamaxon St., Philadelphia, Pa.

**WHEELS (Metal)**
Electric Wheel Co., Quincy, Ill.

**WHEELS (Wire)**
Osborn Mfg. Co. 5401 Hamilton Ave., Cleveland, O.

**WIRE BRUSHES**
Osborn Mfg. Co. 5401 Hamilton Ave., Cleveland, O.

**WIRE CLOTH**
Buffalo Wire Works Co., 425 Terrace, Buffalo, N. Y.

**WIRE NAILS**
Bethlehem Steel Co., Bethlehem, Pa.

**WOODWORKING MACHINERY**
Delta Mfg. Co., Industrial division 620 E. Vienna Ave., Milwaukee, Wis.
Freeman Supply Co., 1152 Broadway Toledo, Ohio.
Kindt-Collins Co., 12653 Elmwood Ave., Cleveland, O.
Oliver Machinery Co., Grand Rapids, Mich.

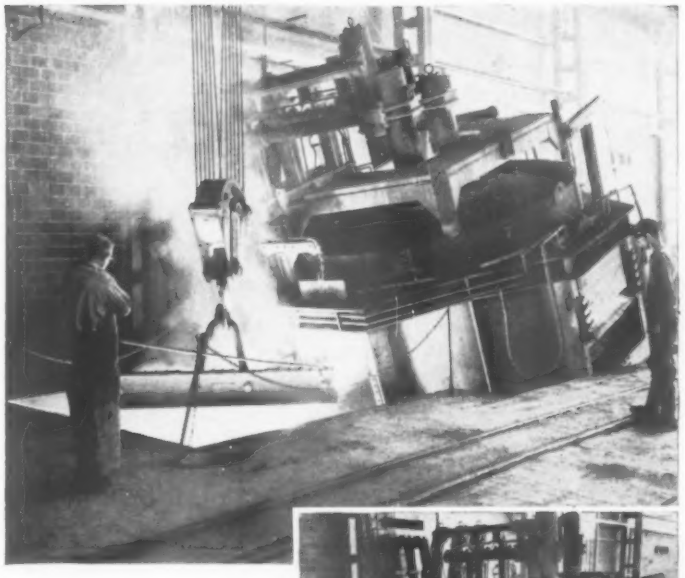
**X-RAY EQUIPMENT**
General Electric X-Ray Corp., Dept. N 37, 2012 Jackson Blvd., Chicago, Ill.
Kelley-Koett Mfg. Co., 212 W. 4th St., Covington, Ky.
Magnaflux Corporation, 5910 Northwest Highway, Chicago, Ill.
Picker X-Ray Corp., 300 Fourth Ave., New York, N. Y.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

**X-RAY FILMS**
Picker X-Ray Corp., 300 Fourth Ave., New York City.

**X-RAY INSPECTION**
Kelley-Koett Mfg. Co., 212 W. 4th St., Covington, Ky.
Magnaflux Corporation, 5910 Northwest Highway, Chicago, Ill.
Picker X-Ray Corp., 300 Fourth Ave., New York, N. Y.

**ZINC**
American Smelting & Refining Co., 120 Broadway, New York

—*When writing advertisers, please mention* THE FOUNDRY—



*Floor-mounted, cylindrical shell, Type 20 Heroult Furnace for the production of stainless steel. An all-welded unit designed for charging with an open-hearth charging machine, equipped with rocker type tilting mechanism, and embodying all latest improvements.*

# Heroult
## ELECTRIC FURNACES

AMERICAN BRIDGE Heroult Electric Furnaces now embody novel and distinctive features—the result of constant striving to perfect the most modern and economical tool for efficient melting and refining of iron and steel for castings, high grade alloy, tool and stainless steels.

Dependent on size and operating requirements, they are adaptable to hand, chute, machine or drop-bottom bucket charging. Capacity ratings range from ½ to 100 tons.

Why not avail yourself of the technical knowledge and wide practical experience of our furnace specialists for your specific requirements.

**AMERICAN BRIDGE COMPANY**

*General Offices:* Frick Building, Pittsburgh, Pa.

Baltimore · Boston · Chicago · Cincinnati · Cleveland · Denver
Detroit · Duluth · Minneapolis · New York · Philadelphia · St. Louis
Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
United States Steel Export Company, New York

USS

UNITED STATES STEEL

**GREENE ELECTRIC STEEL MELTING FURNACES**

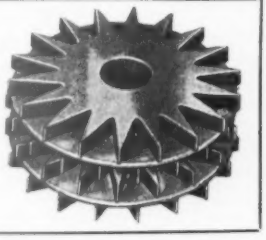
5 ft. Shell Diam. (V-5) 300 KW
to
15 ft. Shell Diam. (V-15) 10,000 KW

**GREENE ELECTRIC FURNACE CO.**
2702 6th So., Seattle, Wash.

**Grinding Wheel Dressers**

■ We manufacture the only complete line of dressers and cutters. Write for copy of catalog "F" and name of your nearest dealer.

**DESMOND-STEPHAN MFG. CO.**
Urbana, Ohio
Canadian D. S. Mfg. Co., Hamilton, Ont.



**Employee Identification Badges**
**Tool Checks—Time Checks**
*Plastic Cases for Work Cards*
**ST. LOUIS BUTTON COMPANY**
*50 YEARS OF SERVICE*
415 LUCAS AVE. ST. LOUIS (2), MO.

**Quilted Asbestos Mitt won't fray**

**ON TOUGHEST JOBS** Troubled executives find new *QUILTED* asbestos mitt *won't* shred, *won't* fray on tough jobs handling hot metals, molds, other hot materials. Quilted both sides, reversible to fit either hand; gives double duty, double wear. Just one of many interesting Safety Ideas invaluable to production-minded executives. 4300 items in line—gloves, aprons, sleeves, spats, etc. *Send for new catalog now.*

**INDUSTRIAL GLOVES CO., 203 Garfield Blvd., Danville, Illinois**
*(In Canada: Safety Supply Co., Toronto)*

# WEST CUT-OFF WHEELS

*The only wheel developed especially for the cutting of gates and risers*

THERE IS A WEST WHEEL FOR EVERY NONFERROUS, STEEL OR IRON CUTTING JOB

**THE WEST COMPANY**

1117 SHACKAMAXON ST., PHILADELPHIA, PA.

# Classified Advertising

## Help Wanted

**REPRESENTATIVE WANTED**

**Foundry supply salesman wanted to cover Western New York state and Eastern Pennsylvania for large foundry supply house.**

**Give references and information as to present connections. Replies will be treated confidentially.**

**Address Box 206, The FOUNDRY, Cleveland**

**SUPERINTENDENT**

For large malleable foundry. Good opportunity for one who can demonstrate real ability. If your application is to receive full consideration, it must give complete details as to business connections, exact duties, references, age, draft status, salary expected, and how soon available.

**ADDRESS: BOX 132 The FOUNDRY**

**CLEVELAND, OHIO**

**WORKING FOREMAN**

Small busy jobbing brass foundry in New York City. Experienced, bench work and knowledge of molding machines. Permanent position with old established responsible corporation with unusual post war future. Write fully stating age, experience, salary. Address: FOUNDRY, P. O. BOX 6, STATION A, NEW YORK, N. Y.

**REPRESENTATIVES WANTED**

Well-known manufacturer of high grade line of plumbago, facings, parting, blacking, core wash and allied foundry items wishes to obtain additional representation by salesmen now calling on foundries regularly. Liberal commission basis. Please advise territory covered, lines now handled, experience with foundry items, etc. Address Box 217, The FOUNDRY, Cleveland.

**COST ACCOUNTANT WANTED**

Large gray iron foundry in middle west specializing in medium and heavy castings desires experienced cost accountant. State age, education, experience, draft classification and salary desired. Address: Box 181, The FOUNDRY, Cleveland.

**STEEL FOUNDRY CORE ROOM FOREMAN**

For small and medium castings, located in Western New York. Give references, salary expected and all particulars in first letter. Address: Box 201, The FOUNDRY, Cleveland.

## Help Wanted

**METALLURGIST**

For medium size plant with gray iron foundry and heat treating department. Basic college course in metallurgy and limited experience in ferrous metallurgy required. Permanent position with excellent opportunities. Location in Southwest. State education, experience, age, draft status and other particulars including recent photograph in first letter. Essential worker applicant must have war manpower commission certificate of availability. Address: Box 164, The FOUNDRY, Cleveland.

**FOUNDRY SUPERINTENDENT**

Capable of taking complete charge of gray iron and steel foundry with cupola capacity of 200 ton and steel capacity of 24 ton. Plant located in the Middle West with employment of 500 in Foundry Department. Address: BOX 177, The FOUNDRY, CLEVELAND.

**WORKS MANAGER**

For Steel and Iron foundry near Chicago, competent to take entire charge of plant operation. Must be familiar with requirements of both jobbing and production work; know heat treating and practical metallurgy; able to develop foremen and handle men. Large plant; progressive company; high standing; good labor relations. We want a man who can earn at least $10,000.00 per year and who is interested in a permanent position. Correspondence confidential. Give complete history and experience.
Address Box 213, The FOUNDRY, Cleveland.

**CLEANING ROOM FOREMAN**

For steel foundry—Castings up to 1500 pounds. Subject to rigid inspection. Must have good record in handling all types of labor, to get out production. Philadelphia district. Address: Box 226, The FOUNDRY, Cleveland.

**FOUNDRY MASTER MECHANIC**

Modern mechanized foundry in Middle-West, engaged in war production and also undergoing postwar rehabilitation program, wants a man with knowledge of foundry engineering and experience in preventive maintenance. A real opportunity for the future—not a temporary war job. Address Box 211, The FOUNDRY, Cleveland.

**MOLDING FOREMAN**

**For large steel foundry.** Experienced in Machine, Floor and Sand Slinger Operation. Give Names of Former Employers and Length of Time Employed.
Address Box 218, The FOUNDRY, Cleveland.

**WANTED**

Foundry foreman having had experience in cupola practice and mixing various irons. Coreroom and molding practice. Must be able to handle men. Light, medium and heavy castings. Jobbing foundry in Wisconsin.
Address Box 215, The FOUNDRY, Cleveland.

**CORE ROOM FOREMAN**

Experienced man for jobbing malleable iron foundry, light and medium castings. Excellent peace-time opportunity for the right man. Write, giving complete qualifications, age and previous experience. Address: Box 180, The FOUNDRY, Cleveland.

**FOUNDRY FOREMAN**

Foundry foreman wanted for small gray iron foundry, making light and medium castings, located in Southern Ohio. A good opportunity for all around foundryman. Please state age, experience, salary desired and draft status. Address: Box 208, The FOUNDRY, Cleveland, O.

## Help Wanted

**MALLEABLE FOUNDRY FOREMAN**

Excellent opportunity in jobbing shop for practical foundryman who wants assurance of a post-war position. Write, giving complete qualifications, age and previous experience. Address: Box 179, The FOUNDRY, Cleveland.

**WANTED**

Steel and gray iron molders
Union shop

**N. & S. FOUNDRY COMPANY,**
**SEATTLE, WASH.**

**HELP WANTED**

Young man, technical training preferred, to assist foundry foreman in medium small gray iron foundry. Chief requirement is ambition to qualify for foundry superintendent's position. Permanent position for the right man.
Address Box 212, The FOUNDRY, Cleveland.

**WANTED**

Jobbing foundry manager or superintendent. Must be well versed in metals and molding, both green and dry sand. State qualifications. (Detroit district).
Address Box 216, The FOUNDRY, Cleveland.

**STEEL FOUNDRY FOREMAN**

For small and medium castings, located in Western New York. Give references, salary expected and all particulars in first letter. Address: Box 200, The FOUNDRY, Cleveland.

**FOUNDRY MANAGER—OPPORTUNITY**

LIGHT STEEL FOUNDRY, PRODUCTION 600 TONS MONTHLY, MOSTLY WAR WORK. MUST BE EXPERIENCED, PRACTICAL PRODUCER. GOOD SALARY, PER CENT OF PROFIT. RIGHT MAN CAN BECOME COMPANY OFFICIAL. LOCATED IN OHIO. ADDRESS: BOX 229, The FOUNDRY, CLEVELAND.

**STEEL MELTER FOREMAN**

Acid electric practice for medium carbon and low alloy castings. Ability to direct men of major importance. Address: Box 228, The FOUNDRY, Cleveland.

**CASTING INSPECTOR**

Wanted a man who can do final casting inspection and layout work for gray iron foundry located in Northern Ohio. Must have complete pattern experience. Salary or hourly rate with bonus. Please give full qualifications and previous experience. Address: Box 231, The FOUNDRY, Cleveland.

**CORE ROOM FOREMAN**

For gray iron foundry located in Northeastern Ohio using production and semi-production medium size cores. Payment on the basis of salary and bonus. When writing, please give all qualifications, experiences, references, etc. Address: Box 230, The FOUNDRY, Cleveland.

## Positions Wanted

**GENERAL MANAGER**

Mature, profit-minded, dependable. Has successfully managed four companies taken two out of the red. Available for service shortly with medium-sized company requiring reliable directing ability in management, sales, finance and production. Extensive experience foundry, machinery, tool and related lines. Address: Box 199, The FOUNDRY, Cleveland.

**FERROUS AND NONFERROUS FOUNDRY SUPERINTENDENT**

A THOROUGHLY TRAINED, ACTIVE FOUNDRY SPECIALIST IS AVAILABLE AT SHORT NOTICE. WIDE EXPERIENCE AS TROUBLE SHOOTER AND PRODUCTION BOOSTER. ADDRESS: BOX 192, The FOUNDRY, CLEVELAND.

# Classified Advertising

## Positions Wanted

**FOUNDRY SUPERINTENDENT OR MANAGER**

Forty years' practical and technical experience in all lines and metals. Sixty years of age. Can manage and handle men successfully. Active and energetic. Prefer Middle West and West Coast. Address: Box 101, The FOUNDRY, Cleveland.

**FOUNDRY SUPERINTENDENT**

Fully experienced in nonferrous metals—light, medium and heavy castings. Rigging, gating, cost estimating, blue print reading and core room production. Neat appearing and aggressive. Age 42. Thorough experience as foundry superintendent. Address: Box 194, The FOUNDRY, Cleveland.

**PLANT MANAGER OR SUPERINTENDENT**

Nineteen years experience, both practical and technical, in gray iron production work. Thorough understanding of cupola and sand control. Also experience in purchasing, production and cost control. Married, 39 years old. Wish to make a connection with postwar possibilities, preferably in the East but would consider Middle West. Address: Box 207, The FOUNDRY, Cleveland, O.

**SUPERINTENDENT**

A practical gray iron foundryman of 24 years' broad experience producing quality castings, well versed in both green and dry sand molding machines, rigging for production, cupola, cores, etc. Would like to contact good reliable firm who needs a high grade foundryman to get results. Address: Box 910, The FOUNDRY, Cleveland.

**BRASS FOUNDRY SUPERINTENDENT**

Desires to make change. Practical man well versed in all phases of the trade. Knows metals and alloys and production of all types of small and large castings. East coast preferred. All correspondence held confidential. Address: Box 219, THE FOUNDRY, Cleveland.

**FOUNDRY SUPERINTENDENT**

Employed. Desires position in Central or Southern New England. Vast experience on green or dry sand. Modern cupola practice and sand control. Address: Box 202, The FOUNDRY, Cleveland.

**GENERAL MANAGER**

Desires position with Steel Foundry, making Open Hearth or Electric Steel Castings. Twenty-five years' experience in all departments of Steel Foundry. At present employed, and desires change. Address: Box 225, The FOUNDRY, Cleveland.

**GRAY IRON FOUNDRY SUPERINTENDENT OR GENERAL FOREMAN**

Thirty years' foundry experience of which has been superintendent and general foreman for twenty years on jobbing machinery, castings and practical foundryman in every detail. New Jersey preferred. Best reference. Address: Box 222, The FOUNDRY, Cleveland.

**STEEL FOUNDRY MANAGER**

If you are looking for a steel foundry manager, may I present my credentials and talk with your officials? Address: Box 190, The FOUNDRY, Cleveland.

**FOUNDRY FOREMAN**

Experienced foundry foreman wants charge of gray iron shop running about twenty tons per day. Thoroughly experienced in molding and cupola practice. Address: Box 169, The FOUNDRY, Cleveland.

## Positions Wanted

**MELTING FOREMAN**

ACID ELECTRIC FURNACES. WELL EXPERIENCED IN ALL TYPES CAST ALLOY STEELS. BEST OF REFERENCES. ADDRESS: BOX 221, THE FOUNDRY, CLEVELAND.

**FOUNDRY SUPERVISOR**

Practical Grey Iron Foundryman. Well trained for high class supervisory, technical and executive position in a grey iron foundry organization. Twenty-five years' broad experience producing quality castings, light, medium and heavy. Machine tool engine, general jobbing and production. Well versed in cupola operation, metallurgy, foundry cost and incentive system. Able to train and direct subordinates. Middle age and out of draft. Address: Box 227, The FOUNDRY, Cleveland.

**FOUNDRY MANAGER OR SUPERINTENDENT**

Available, practical and technical foundryman of thirty years' experience in steel, high chrome and nickel alloys. Familiar with all phases of the foundry industry including present day labor conditions. Energetic, physically fit. Desires change with firmly established concern where his executive ability can be fully used and remunerated. Address: Box 232, The FOUNDRY, Cleveland.

## Wanted-To-Buy

**WANTED**

Production patterns for sash weights. State condition and price in first letter. Address: Box 158, The FOUNDRY, Cleveland.

**WANTED**

Brackelsburg Furnace ten ton Capacity. Address Box 209, The FOUNDRY, Cleveland.

**WANTED**

"AA" size 62-52" cutting cylinder 4 Cylinder Gas Engine Sand Cutter.

**SANITARY COMPANY OF AMERICA, LINFIELD, PA.**

**CORE OVENS WANTED**

Total of 900 cubic feet core baking space urgently needed. Preference is battery two or three ovens. Can be fired by coal, coke, oil or electricity. Address Box 214, The FOUNDRY, Cleveland.

**WANTED TO BUY OR RENT**

Gray iron foundry with modern molding machines, together with cleaning equipment for producing light and medium weight castings. Would prefer location in northern New Jersey or Eastern Pennsylvania. Might consider Connecticut. What have you to offer? Reply: Box 223, The FOUNDRY, Cleveland.

**MIXERS WANTED**

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price for immediate acceptance. Address Box 578, The FOUNDRY, Cleveland.

## Foundries for Sale

**FOR SALE**

Jobbing Steel Foundry located in central Michigan and equipped with a 1½ ton per hour "Electromelt" acid type electric furnace, two traveling cranes and the usual foundry equipment. Now employing approximately 105 men and operating at a substantial profit. Foundry is offered for sale as a going concern, for cash. Address: Box 229, The FOUNDRY, Cleveland.

## Foundries for Sale

**FOUNDRY NON-FERROUS**

Est. over 30 years; near Cleveland; furnace capacity 3 ton; metal flasks; well equipped; employ 50; same clientele for many years; sales over $500,000 year; large back-log; excellent profits; sell complete; for details.

**THE APPLE COMPANY**
**BROKERS EST. 1905 CLEVELAND, OHIO**

**FOR SALE**

Well equipped gray iron foundry in Ohio now doing war work. Address: Box 204, The FOUNDRY, Cleveland.

## Foundry Work Wanted

**WANTED**

Brass & Aluminum Foundry Work
Also Pattern Work
ADDRESS: CASA GRANDE BRASS WORKS, RT. 5, SE., MUSKOGEE, OKLAHOMA.

TEL. 9517-F2

## Employment Service

**GRAY IRON FOUNDRY EMPLOYMENT**

We are receiving many inquiries for superintendents, metallurgists and foremen. We shall be glad to hear from qualified men. No charge.

**Gray Iron Founders' Society Inc.**
**1010 Public Square Building Cleveland, Ohio**

**SALARIED POSITIONS**

This advertising service of 33 years' recognized standing negotiates for high salaried supervisory, technical and executive positions. Procedure will be individualized to your personal requirements and will not conflict with Manpower Commission. Retaining fee protected by refund provision. Identity covered and present position protected. Send for details.

**R. W. BIXBY INC.**

**101 Delward Bldg. Buffalo, N. Y.**

## For Sale

**FOR SALE**

SAND BLAST BARREL: One American Foundry No. 2 Pressure type with 42" x 36" Drum No. 9292 P.R. arranged with Belt Drive, with Gravity Feed Shot, and with Pit Shot Tank.
AIR COMPRESSOR: One Bury Steam operated 14 x 14 x 14 Type U.R.S. 100 maximum pressure.

Cheap to quick buyer. Address:
**BOX 224, The FOUNDRY, CLEVELAND.**

**FOR SALE**

1—40" x 50" x 13" dia. Herman Pneumatic Jarring Machine Serial No. 2825.
1—48" x 72" dia. Herman Pneumatic Jarring Machine Serial No. 3130.
1—48" Cupola Overall Height 55 ft., 6 tuyeres 5" dia.
1 Mogul Metallizer Unit No. M-160-B complete

Address
**VULCAN MOLD & IRON COMPANY**
**LATROBE, PENNA.**

# Classified Advertising

## For Sale

### SPECIAL DEFENSE BARGAINS

**Cast Iron and Steel Plate** Mill-Dust & Shavings Exhausters 50 in stock. **Cupola and Furnace** Blowers for Coke, Oil or Gas Combustion.

Brass Foundry Furnaces: No. 2—42"—class A Schwartz, with or without blower.

1—Hausfeld No. 150 crucible size tilting furnace with oil burner.

Two Monarch Rotating Barrel type furnaces each 500 lbs. per heat capacity, one newly carborundum lined.

1—Hausfeld No. 150 crucible size tilting furnace, oil or gas fuel.

1—Hausfeld 400 lbs. non-crucible per heat capacity, complete—newly lined and with Electric Blower set attached, for 3/60/220 A.C.

1—Booth Electric Furnace with accessories 725 lbs. cap., with new unused extra cylindrical lining.

Can furnish stationary furnaces on short notice for crucibles No. 60 to No. 125 with swing top covers.

Molding Machines:

1—Battenfeld stationary jolt—squeeze—lift 17" x 22" table.

1—Battenfeld stationary jolt—squeeze 17" x 22" table.

1—Tabor plain jolt table No. B-8—28" x 40".

1—Tabor plain jolt table No. B-6—30" x 36".

1—Tabor plain jolt table No. B-18—54" x 96".

Tumbling Mills:

1—Sly 48" x 60" round 1" thick steel shell.

1—Ransohoff Patented Round, ¾" thick steel Tumbling Mill work chamber 48" x 48" with star separating device, for wet tumbling, with 10 HP 600 RPM A.C. motor and transmission for direct connection, nearly new.

1—Woodison core machine, hand jolt-rollover-drawn for multiple core plate work.

1—Dings No. 2 Magnetic Separator with AC-DC Motor Generator Set.

1—Hill & Griffith portable core oven, semi circular.

1—Burton portable core oven cabinet type.

1—Spencer blower 3600 CFM @ 1½ lbs.—40 h.p. motor.

1—Spencer blower 2250 CFM @ 1½ lbs.—25 h.p. motor.

1—Core sand mixer 3 cu. ft. capacity.

**CLIFTON MACHINERY CO.**
**1023 W. 6TH, CINCINNATI, OHIO**

### REBUILT EQUIPMENT IN STOCK
### IMMEDIATE SHIPMENT
### MISCELLANEOUS ITEMS

(1)—No. 60 Fisher stationary crucible Furnace, oil fired, new lining.
(1)—3-ton geared crane type Ladle.
(2)—1¾" Power Sprue Cutters.
(4)—Branford Shakeout Vibrators.
(1)—10" Tabor Post Type Squeezer.
(2)—1½-yd. Hayward 230-VDC. Elec. Buckets.
(1)—1½ yd. single Line Brosius Bucket.

### ELECTRIC MONORAIL HOISTS

(1)—1½-ton Shepard, 1-motor, 220/3-60-cy.
(2)—1-ton Euclid, 1-motor, 110/230-VDC.
(3)—1 & 2 ton Shepard, 1-motor, 230-VDC.
(2)—1 & 2 ton Shepard, 2-motor, 230-VDC.

### OVERHEAD ELECTRIC TRAVELING CRANES

| TONS | MAKE | SPAN | CURRENT |
|---|---|---|---|
| (1) 1 | Maris | 35'7" | 230-VDC |
| 3 | Euclid | 30'0" | 230/3/60-cy |
| 5 | Shepard | 30'0" | 230-VDC |
| 7½ | Northern | 28'0" | 220/3/60-cy |
| 10 | Whiting | 32'0" | 230/3/60-cy |
| 10 | American | 54'11½" | 230-VDC |
| 10 | Morgan | 58'2" | 230-VDC |
| 25 | P & H | 50'0" | A.C. or D.C. |
| 75/25 | Morgan | 59'0" | 230-VDC |

Following two cranes are Underslung Type.

| | | | |
|---|---|---|---|
| 3 | Armington | 30'0" | 230-VDC |
| 3 | Sprague | 20'6" | 230-VDC |

Our large modern plant is equipped to rebuild any of these cranes to suit your requirements. Send us your motor inquiries—we have a large stock of Crane, Mill & General Purpose Motors.

**T. B. MacCABE CO.**
**4304 Clarissa St. PHILADELPHIA 40, PA.**

## For Sale

### REBUILT
### BLOWERS—FANS—EXHAUSTERS

Roots-Connersville positive cupola blowers. Centrifugal blowers for gas and oil burning. Sand blast, grinder end dust exhausters. Ventilating fans.

**GENERAL BLOWER COMPANY**
**406 N. Peoria St. Chicago, Ill.**

### AIR COMPRESSORS

BELTED—176 ft., 355 ft., 540 ft., 676 ft., 752 ft. & 1300 ft.

ELECTRIC—355 ft., 528 ft., 676 ft., 807 ft., 1302 ft., 1723 ft., 2022 ft., 2200 ft., 2800 ft., 3600 ft., & 5000 ft.

### STEEL TANKS

9—5000 gal., 11,500 and 18,000 gal. cap.
17—1000 bbl., 4000 bbl. and 10,000 bbl. cap.

### TANKS BOUGHT AND SOLD

**R. C. STANHOPE, INC.**
60 East 42nd St. New York, N. Y.

### FOR SALE

1 No. 275 Oil fired Tilting Crucible Furnace Suitable for Nonferrous Melting. Address Box 210, The FOUNDRY, Cleveland.

### CENTRIFUGAL COMPRESSOR

350/400 Cfm @ 35 lbs., 3 stage Allen & Billmyre, 6 x 6½ Centrifugal Compressor with 15 H.P. 3600 RPM AC motor drive.

### SAND VIBRATOR

Jeffery-Traylor, shaker type CVS-8, 6" wide hand deck, capacity 7 to 8 tons sand per hour; with 15 cycle, 110 volt, single phase vibrator motor generator set. Write, wire or phone.

**THE MOTOR REPAIR & MFG. CO.**
**1552 HAMILTON AVE. CLEVELAND, OHIO**

### REBUILT USED EQUIPMENT

Molding machines, all types; tumbling mills; furnaces; cupolas; air compressors; hoists; rammers, all types; ladles, all types; sand mixers; sand blast tanks; core machines, etc. All equipment rebuilt and guaranteed. All sizes used steel flasks.

**HAYNES FOUNDRY EQUIPMENT COMPANY**
**1734 Lake St. Kalamazoo, Mich.**

### FOR SALE

Type G. F. Pangborn Rotoblast complete with loader and motors; can be inspected in operation Elkhart, Indiana; owner replacing with larger sandblast. Address: Box 183, The FOUNDRY, Cleveland.

### WELDING, CUTTING EQUIPMENT

Torches, Regulators and Gauges.
Aircraft welding outfits.
Lead welding outfits and torches.
Soldering outfits, Acetylene Generators.
Supplies, Electric Arc Welders, Electrodes.

**Superior Oxy-Acetylene Co.**
**Hamilton -:- Ohio**

## For Sale

### FOR SALE

1—Chicago Pneumatic Air Compressor 12" x 11" 75 HP, switch box and starter, complete for operation, $825.00.
1—10" x 10" Bury Air Compressor, 40 H motor switch and starter, $650.00.
1—G. H.-2 Pangborn Sand Blast Barrel, complete with air tank, elevator, hopper, $200.00 worth of new parts, $900.00.
1—275 gal. Fuel Oil Tank with Oil Pump and motor, $250.00.
1—Howe Portable Platform Scales, 4 ft. square platform, $225.00.
1—Herman Roll Over Machine.
1—Wire Straightener.
1—Double Disc Grinder.
3—Blystone Mixers, 2 motor driven, 1 tight and loose pulley.
2—MB Royers.
1—D Royers.
2—Lowe Electric Riddles.
3—Combs Electric Riddles.
2—10 Ton Worm Gear Ladles (One new)
1—5 Ton Worm Gear Ladle.
1—4 Ton Worm Gear Ladle
1—3 Ton Worm Gear Ladle
1—2 Ton Worm Gear Ladle
6—1500 lb. Worm Gear Ladles
6—1500 lb. Finger Gear Ladles
1—Type "F" International Rollover 30" x 12".
1—Type "F" International Rollover 26" x 12".
2—Automatic Lift Trucks generated by a battery.
72—Skids for Lift Trucks.
1—6 ft. Rotoblast.
This equipment has all been rebuilt.

**HAYNES FOUNDRY EQUIPMENT COMPANY**
**1734 LAKE ST. KALAMAZOO, MICH.**

### USED FOUNDRY EQUIPMENT

The demand for used foundry equipment of all types is urgent.

A short classified advertisement in The FOUNDRY will help someone locate much needed auxiliary equipment.

### POSITION WANTED

Minimum advertisement set solid, 30 words $1.50. Additional words 5c each. Same advertisement all caps, 30 words $2.00. Additional words 7c each.

### HELP WANTED

Minimum advertisement set solid 50 words or less $3.00. Additional words 6c each. Same advertisement all caps, 50 words $4.00. Additional words 8c each.

### FOR SALE

Minimum advertisement set solid, 30 words or less $3.00. Additional words 10c each.

### WANTED

Minimum advertisement set solid, 30 words or less $3.00. Additional words 10c each.

Miscellaneous advertisements such as "Personals", "Services" etc., minimum 30 words set solid, $3.00. Additional words 10c each.

Note: If replies are to be sent to a box number in care of The Foundry, add 6 words to your advertisement for box number and address.

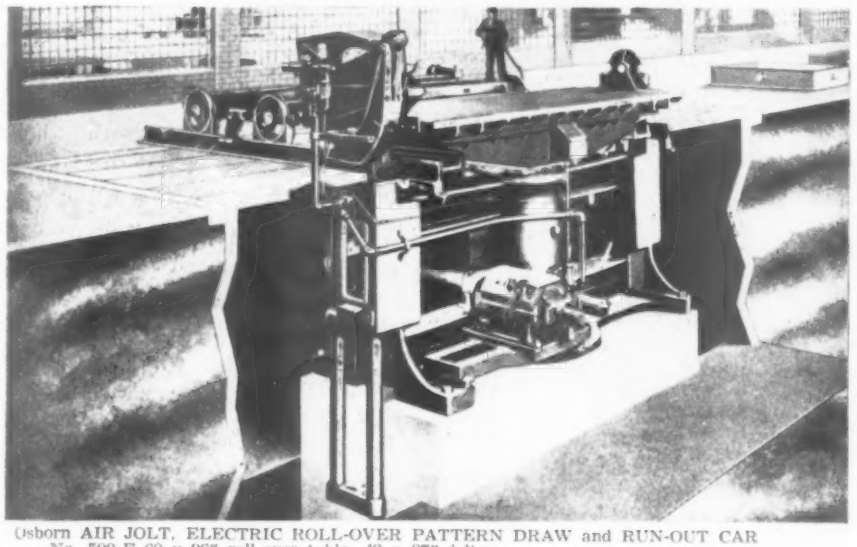
**ADDRESS**
**CLASSIFIED ADVERTISING SERVICE**

**THE FOUNDRY**
**PENTON BUILDING CLEVELAND, O.**

# SCULLY Reconditioned Foundry Equipment

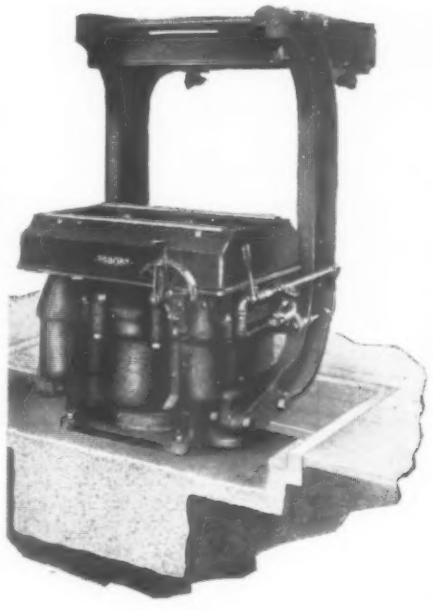
★ ALL SCULLY EQUIPMENT IS REBUILT AND OVERHAULED IN OUR OWN, NEW MACHINE SHOP

## OSBORN MOLDING MACHINE



Osborn AIR JOLT, ELECTRIC ROLL-OVER PATTERN DRAW and RUN-OUT CAR
No. 509-E 60 x 96" roll-over table, 42 x 87" jolter.
No. 513-E 36 x 124" roll-over table, 36 x 112" jolter.

## OSBORN JOLT SQUEEZE & POWER STRIP



**No. 703 OSBORN**
**(Similar to above excepting with roll-off)**

No. 703-6 Osborn jolt squeeze and strip, 21 x 28" table, stationary. Length of opening in lifting frame 34", 6" pattern draw, 8" cyl. dia. 1000 lbs. jolting cap. @ 80 lbs. press. Distance from lifting frame to squeeze head 24¼", flask length 44½" with roll-off conveyor.

No. 703-5 Osborn, same as above, excepting 17 x 35" table.

## MOLDING MACHINES

No. 49 Davenport jolt roll-over draw, outside flask cap. 50 x 72" pattern draw 18"—4500 lbs. cap. @ 80 lbs. pressure, jolt cyl. dia. 14".

Osborn No. 332 jolt roll-over and squeeze (pit type) flask cap. max. length 36" width 26", pattern draw 9", jolt cyl. dia. 7", 750 lb. jolting cap. @ 80 lb. press., 44" between uprights.

## HERMAN Independent Turn-Over and Pattern Drawing Device

60 x 84" roll-over, 60 x 72" bumper, 10,000 lbs. cap. @ 80 lbs.

60 x 72" roll-over, 60 x 72" bumper, 10,000 lbs. cap. @ 80 lbs.

40 x 56" roll-over, 40 x 58" bumper, 3000 lbs. cap. @ 80 lbs.

## JOLT SQUEEZE STRIPPERS

No. 142 Milwaukee, stationary, 1200-lb. cap. @ 80 lbs., 6" draw, table 19 x 35"—open end type.

No. 113 Milwaukee, open end type, portable, 500-lbs. cap. @ 80 lbs., 6" draw, 16 x 35" table.

Osborn No. 82 STRIPPING PLATE JOLT SQUEEZER, 46" between rods, 10" draw, 1200 lbs. jolting cap., 1000 lbs. stripping cap. 24 x 36" table, pin lifts 12" part one way, 36" the other.

Nicholls Type "D" stationary heavy duty JOLT SQUEEZE & PATTERN DRAW, squeeze piston 14" jolt piston 6", draw 2-6"—distance between strain rods 40" take approx. 15 x 24" flask.

## MISCELLANEOUS

1½ yd. Hayward Elec. Bucket, with 230V DC Electro Dynamic Motor, hoist cap. 8000 lbs., 6 HP Motor.

Sullivan Drill Sharpener Class "A" for hammer-forging drill bits and shanks, heavy duty Compressed Air Machine, floor area 30 x 60" with 2 air hammers and compressed air vise, blow gun (approx. shipping weight 3800 lbs.).

1½" Acme Upsetting FORGING MACHINE.

Massillon 1200 lb. cap. with 4" dia. piston STEAM OPERATED DROP HAMMER.

Chambersburg Engr. 1000 lb. cap. STEAM OPERATED DROP HAMMER.

—:— **Address Chicago 36, Ill.** —:—

## AMERICAN SANDCUTTERS

Cleveland-American (similar to Model "K") 84" spiral cutting cyl., 36" dia., 92" between tractor wheels, 5" face—equipped with Cleveland 3-phase 60 cycle 220V AC Motors, Cable and Take-Up Reel.

American Fdry. Model "K" heavy duty type, size 72, equipped with Buda Type "WTU" 20 HP Gas Engine, 72" between tractor wheels, 6" face, having 60" cutting cyl.

Model "AA" size 62, 66" between tractor wheels, 4" face—O/A width 85". Length 96" and Height 80"—equipped with 4 cyl. Waukesha Gas Engine, 52" cutting cyl.

**NO. 8 DEMMLER CORE BLOWING MACHINES**

## EXHAUST TUMBLING MILLS

40" square x 84" long Sly, ¾" plate door opening entire length of barrel, renewable trunnions, pulley drive.

LOT 34" dia. x 74" long Whiting, door opening entire length of barrel, renewable trunnions, clutch pulley drive.

## MAGNETIC SCREEN SEPARATOR

Magnetic Mfg. Co. size 30" dia. x 80" long drum SCREEN MAGNETIC SEPARATOR 115 V 4.5 Amps. Type F-3, complete with shunt wound 3 HP DC 1700 RPM Motor, elevator 10'4" O/A height, 18" width, 22" depth.

**60" SCHWARTZ Furnace, teapot type, oil fired, hand tilting.**

## ELECTRIC HOISTS

1-ton P&H with MOTORIZED TROLLEY, 220V DC Motors, 20 ft. lift, speed 20 FPM.

3-Ton Link-Belt single point suspension with Top Hook (or can add Trolley if required). Floor operated, mechanical lowering brake, 18' lift, speed 18 FPM, equipped with 115 volts, D.C. Motor, or can rewind for 220 V DC service.

4-ton Sprague Monorail Type "W" with motorized Trolley, 230 V DC Motors, double sheave-4-ropes, 25 ft. lift, speed 13 FPM, with open trailing cab.

5-ton Shepard Form 1 Class B-6 equipped with 6 HP 220V DC motor, floor control, 15 ft. lift, speed 15 FPM.

# SCULLY MACHINERY & EQUIPMENT CORP.

(Formerly - Foundry Division of Scully-Jones & Co.)

2031 WEST 74th STREET (Phone PROspect 8770) CHICAGO 36, ILLINOIS

# ADVERTISING INDEX


Adams Co., The 82, 83
Air Reduction 40
Air-Way Pump & Equipment Co. 219
Ajax Metal Co. 184
Alloy Metal Abrasive Co. 215
Aluminum Refiners Div. of Bohn Aluminum & Brass Corp. 47
American Air Filter Co., Inc. 26
American Bridge Co. 233
American-British Chemical Supplies, Inc. 217
American Crucible Co. 199
American Engineering Co. 141
American Foundry Equipment Co. 126, 127, 165, 198
American Gum Products Co. 225
American Monorail Co., The 133
American Optical Co. 29
American Smelting & Refining Co., Federated Metals Division 57
Apex Motor Fuel Co. 123

Bartlett, C. O., & Snow Co. 71
Bay State Abrasive Products Co. 86
Beardsley & Piper Co., The 14, 15
Berkshire Mfg. Co. 226
Bethlehem Steel Co. 1
Blaw-Knox Div. of Blaw-Knox Co. 177
Blodgett, G. S., Co., Inc., The 208
Blystone Div. Standard Sand & Machine Co. 211
Bohn Aluminum & Brass Corp. 47, 63
Brooke, E. & G., Iron Co., The 213
Buckeye Products Co., The 196
Buehler, Adolph I. 70
Buell Engineering Co., Inc. 115

Campbell-Hausfeld Co., The 181
Canadian Radium & Uranium Corp. 169
Cannon Vibrator Co. 226
Capewell Mfg. Co., The 168
Carborundum Co., The 54
Carl-Mayer Corp., The 44
Carman, Edwin S., Inc. 212
Certified Core Oil & Mfg. Co. 129
Champion Foundry & Machine Co. 8, 9
Chicago Manufacturing & Distributing Co. 170
Chicago Pneumatic Tool Co. 18
Chicago Rawhide Mfg. Co. 226
Chicago Tramrail Co. 162
Chicago Wheel & Mfg. Co. 159
Cities Service Oil Co. 174
City Pattern Foundry & Machine Co. 49
Clearfield Machine Co. 24
Cleveland Chaplet & Mfg. Co. 210
Cleveland Flux Co., The 25
Cleveland Pneumatic Tool Co., The 16, 17
Cleveland Rock Drill Co. Div. of the Cleveland Pneumatic Tool Co. 16, 17
Cleveland Tramrail Division, The Cleveland Crane & Engineering Co. 81
Columbia Steel Co. 233
Combined Supply & Equipment Co., Inc. 223
Conco Engineering Works, Division of H. D. Conkey & Co. 200
Construction Machinery Co. 215
Corn Products Sales Co. 176
Cortland Grinding Wheels Corp. 166
Crucible Manufacturers Association 151
Cunningham, M. E., Co. 224

Davenport Machine & Foundry Co. 37
Dayton Oil Co., The 171
Dayton Pneumatic Tool Co. 212
Delta Mfg. Co., The 185
Delta Oil Products Co. 22
Demmler, Wm., & Bros. 178, 230
Dempsey Industrial Furnace Corp. 175
Desmond-Stephan Mfg. Co. 233
Despatch Oven Co. 21
Detroit Electric Furnace Division Kuhlman Electric Co. 189
Diamond Clamp & Flask Co. 34
Dietert, Harry W., Co. 213
Dillon, W. C., & Co., Inc. 216
Dougherty Lumber Co. 220

Eastern Clay Products, Inc. 139
Eichfeld, Wm. F., & Sons Co. 202
Electric Furnace Co. 74
Electric Wheel Co. 203
Electro Metallurgical Co. 67
Electro Refractories and Alloys Corp. 87
Elliott Service Co. 218
Empire Varnish Co., Waterlox Division 229
Eutectic Welding Alloys, Inc. 183

Fanner Manufacturing Co., The 28
Federal Foundry Supply Co., The Front Cover, 2, 205
Fisher Furnace Co. 76
Foundry Equipment Co., The 68, 69
Foundry Services, Inc. 201
Fox Grinders, Inc. 223
Freeman Supply Co., The 88
Fremont Flask Co., The 60
French & Hecht, Inc. 214
Fuller Co. 160

General Blower Co. 227
General Electric X-Ray Corp. 12, 13
Giele, Walter, Co. 214
Globe Iron Co. 227
Globe Steel Abrasive Co. 211
Great Western Mfg. Co. 230
Greene Electric Furnace Co. 233
Grimes Molding Machine Co. 219

Haley Mfg. Co. 232
Hammond Machinery Builders, Inc. 221
Hanna Furnace Corp., The 230
Hauck Manufacturing Co. 218
Haws Refractories Co. 221
Haynes Foundry Equipment Co. 42
Hercules Powder Co., Inc. 119
Herman Pneumatic Machine Co. 84
Hines Flask Co. 64, 65
Hydro-Arc Furnace Corporation 36
Hydro-Blast Corp. 72, 73

Illinois Testing Laboratories, Inc. 201
Imperial Belting Co. 188
Industrial Equipment Co. 221
Industrial Gloves Co. 233
International Molding Machine Co. 144
International Nickel Co., Inc., The 113
Ironton Fire Brick Co., The 149

Jackson & Church Co. 206
Jackson Iron & Steel Co., The 228
Johns-Manville 180
Johnson Corp., The 224

Kelley-Koett Mfg. Co., The 39

Lanly Co., The 197
Lee-Wood, Inc. 211
Lindberg Engineering Co. 32
Link-Belt Co. Back Cover

McCormick, J. S., Co. 55
McLain's System, Inc. 223

Macklin Co. 23
Maehler, Paul, Co., The 78
Mall Tool Co. 229
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc. 213
Marathon Chemical Company Div. of Marathon Paper Mills Co. 155
Marshall, L. H., Co. 225
Master Electric Co. 43
Mathews Conveyer Co. 125
Mathieson Alkali Works (Inc.) Inside Front Cover
Michigan Smelting & Refining Div. of Bohn Aluminum & Brass Corp. 63
Milwaukee Chaplet & Mfg. Co. 187
Milwaukee Foundry Equipment Co. 53
Mine Safety Appliances Co. 173
Modern Equipment Co. 240
Molybdenum Corp. of America 143
Murphy, James A., & Co. 209

National Engineering Co. 10, 11
National Smelting Co., The 20
National Steel Corp. 230
Neff & Fry Co., The 220
Newcomb-Detroit Co. 152
New Haven Vibrator Co. 182
Niagara Falls Smelting & Refining Corp. 222
Nicholls, Wm. H., Co., Inc. 45
Norton Co. 66

Ohio Ferro-Alloys Corp. 19
Oliver Machinery Co. 217
One-Piece Chaplet Co., The 219
Osborn Manufacturing Co., The 30, 31

Pangborn Corporation 6, 7, 161, 228
Parsons Engineering Corp. 239
Peerless Tools, Inc. 232
Penn Iron Works 231
Peters-Dalton, Inc. 179
Pickands Mather & Co. 59
Pioneer Mfg. Co. 196
Pittsburgh Crushed Steel Co. 227
Pittsburgh Lectromelt Furnace Corp. 193
Plaster Process Castings Co. 218
Pollard Oil Products Co. 216
Producers Core Sand Corp. 232
Pyrometer Instrument Co., The 210

Radium Chemical Co., Inc. 223
Ramtite Co., The, Division of The S. Obermayer Co. 85
Ransohoff, N., Inc. 56
Reading Chain & Block Corp. 199
Republic Steel Corp. 75
Riehle Testing Machines—Div. of American Machine & Metals, Inc. 209
Rietz Lumber Co. 226
River Smelting & Refining Co., The 38
Robeson Process Co. 225
Royer Foundry & Machine Co. 35
Ruemelin Mfg. Co. 200

Safety Grinding Wheel and Machine Co., The 157
St. Louis Button Co. 233
Schneible, Claude B., Co. 51
Schramm, Inc. 163
Schundler, F. E., & Co., Inc. 195
Scientific Cast Products Corp., The 212
Scully Machinery & Equipment Corp. 208, 237
Sight Feed Generator Co., The 231
Simonds Worden White Co. 191
Simplicity Engineering Co. 194
Singer Manufacturing Co., The 210
Sly, W. W., Mfg. Co., The 136, 137
Smillie, C. M., & Co. 220
Smith, Werner G., Co., The 4, 5
Smooth-On Manufacturing Co. 207
SPO, Inc. 121
Standard Conveyor Co. 158
Standard Horse Nail Corp. 164
Staynew Filter Corp. 46
Steel Shot & Grit Co. 227
Sterling Grinding Wheel Division of the Cleveland Quarries Co. 131
Sterling Wheelbarrow Co. 58
Stevens, Frederic B., Inc. Inside Back Cover
Stoody Co. 232
Strand, N. A., and Co. 198
Stroman Furnace & Engineering Co. 61
Sullivan Machinery Co. 41
Swindell-Dressler Corp. 50

Tabor Manufacturing Co., The 62
Tamms Silica Co. 202
Tannewitz Works, The 172
Thomas & Proetz Lumber Co. 214
Titanium Alloy Mfg. Co. 48

Union Carbide & Carbon Corp. 67
United Compound Co. 231
United Oil Mfg. Co. 27
United States Electrical Tool Co., The 225
United States Graphite Co. 192
United States Gypsum Co. 33
U. S. Steel Corporation and Subsidiaries 233
U. S. Steel Export Co. 233

Vonnegut Moulder Corp. 167
Vulcan Corp. 186

Wadsworth Core Machine and Equipment Co., The 217
Wahlert Products Corp. 222
Wellman Engineering Co., The 216
West Co., The 233
Western Tool & Mfg. Co., The 224
Wickland, A. A., & Co. 228
Woodward Iron Co. 117
Worthington Pump & Machinery Corp. 79

Young Brothers Co. 134



Table of Contents, Page 3

Refer to alphabetical list of products in "Where-to-Buy" pages, beginning on Page 204

Classified Advertisers, Pages 234, 235, 236, 237

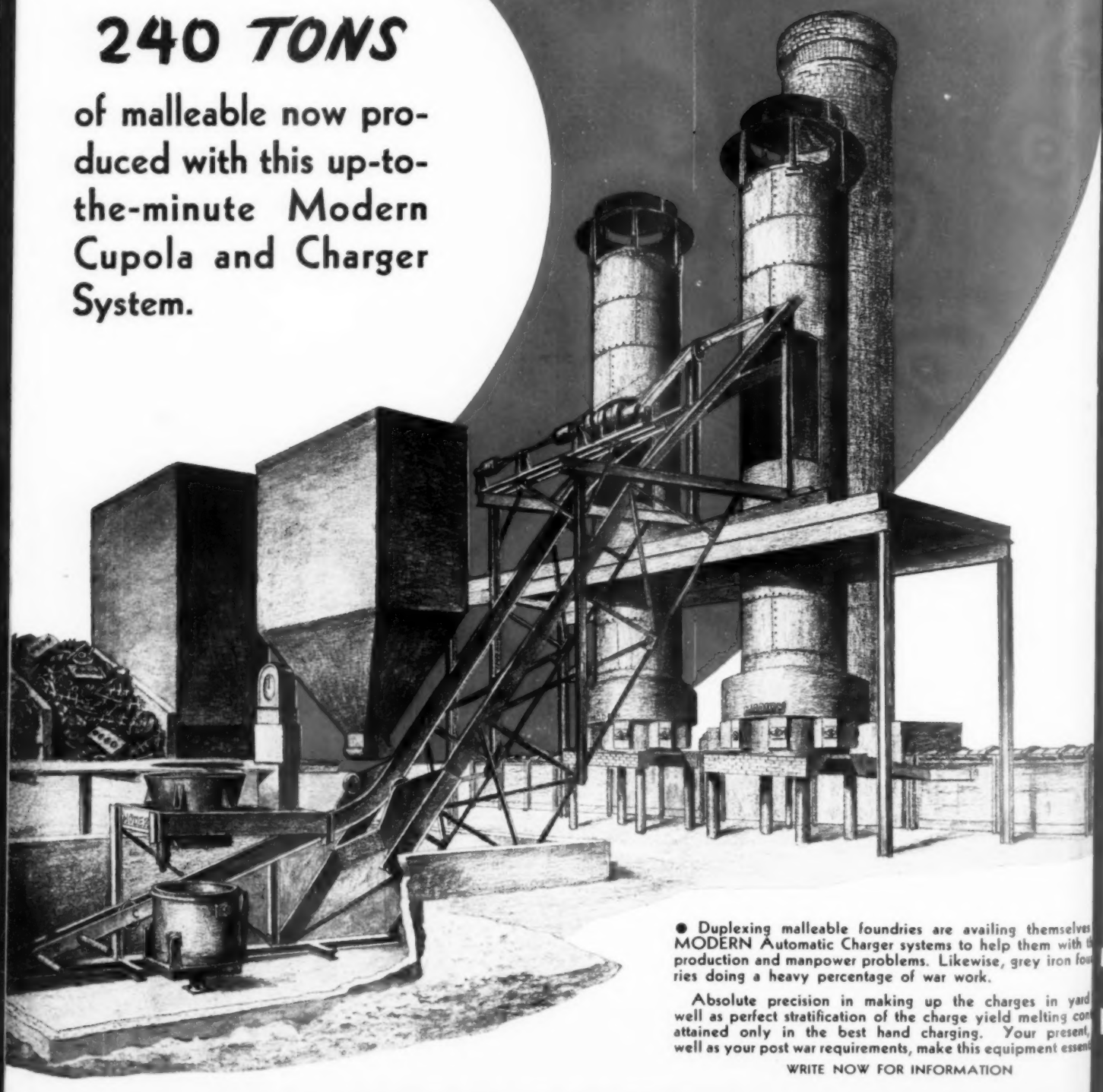
CLEANING
THE DUST AND DIRT
from the Air
Parsons
OVAL BAG DUST ARRESTORS
"A GOOD DUSTING IN MORE WAYS THAN ONE"
• It is a proven fact that clean air in a plant makes an immediate "about face" in production, absenteeism and maintenance costs. In 99 cases out of 100 production and efficiency goes up while maintenance goes down. On a strictly dollar and cents basis Parsons modern Oval Bag dust arrestors pay for themselves in no time because they speed up production, protect and prolong the life of employees, equipment and buildings and pay dividends for years to come. Parsons exclusive features include unique patented Oval Filtering Bags, Non-rusting Arrestor Case, Simple Texrope Drive, Heavy Duty Welded Hoppers. • Modern Dust control by Parsons Ovals means healthier and more profitable business, peak production, less breakdowns, fewer layoffs. Send for our free bulletin.
PARSONS ENGINEERING CORP.
2545 EAST 79th STREET
CLEVELAND, OHIO

# MODERN MELTING

NOW EMBRACES DUPLEXING IN MALLEABLE IRON FOUNDRIES.

## 240 *TONS*

of malleable now produced with this up-to-the-minute Modern Cupola and Charger System.



● Duplexing malleable foundries are availing themselves MODERN Automatic Charger systems to help them with t production and manpower problems. Likewise, grey iron fou ries doing a heavy percentage of war work.

Absolute precision in making up the charges in yard well as perfect stratification of the charge yield melting con attained only in the best hand charging. Your present, well as your post war requirements, make this equipment essen

WRITE NOW FOR INFORMATION

Cupolas • Cupola Chargers • Covered & Insulated Ladles • Lifetime Geared Ladles • Improved Bottom Pour Ladles • Metal Pouring Systems • Crane & Monorail Systems For Metal & Mold Handling • Furnace Charging Cranes • Electric Mold Skin Driers

MODERN EQUIPMENT CO

PORT WASHINGTON, WIS.
DEPT. 184

# We Cover the "Foundry Front" WITH STEVENS CORE WASHES

## Four Suggested Grades for Outstanding Performance

### Stevens No. 114 Core Wash (For Grey Iron)

Proof of the merits of this Stevens Core Wash is cited in the case of a foundry turning out Diesel cylinder liners of Meehanite metal, and losing a number of them to scrap. Molds and cores were of dry sand—core wash applied by brushing and spraying. To correct their trouble, we recommended Stevens No. 114 Core Wash, which, after thorough trials, was exclusively used. RESULTS—Core Wash showed good suspension, scrap was reduced to a minimum; castings were greatly improved.

### Stevens No. 125 Core Wash (For Brass and Bronze)

Developed to seal the core and mold surfaces against penetration or seepage of metal into the sand of cores and molds. It is creamy white; has good suspension and mixes easily with water. Can be applied by dipping, brushing or spraying, being especially adaptable for molds and cores of brass or bronze. Helps prevent costly chipping and grinding; loss of metal; and even spoiled castings.

### Stevens No. 6 Core Wash (For Steel)

Here's a new Stevens Core Wash—developed for use on cores and molds where metal sections are very heavy, especially for cores and molds over which large quantities of molten steel flow when castings are poured.
Can be applied by spraying, dipping or brushing; skin dries without blistering; is carbon free and highly refractory.

### Stevens Carbon Blacking—The "Three-in-One"

As a Core Wash, it sticks like glue—insuring castings with a smooth inside surface.
As a Wet Blacking, it mixes with water easily—has good suspension—castings show a smooth, blue surface.
As a Green Sand Facing, it gives the same good, all-around results.

**Often imitated but never equalled—it is commonly referred to as the "Ace of Core Washes"**

Write for detailed information on these four—or any of the other STEVENS CORE WASHES

***Or, order a barrel on approval . . we will ship it on a satisfaction guaranteed basis.***

*"Everything for a Foundry"*

# FREDERIC B. STEVENS INCORPORATED

DETROIT • MICHIGAN

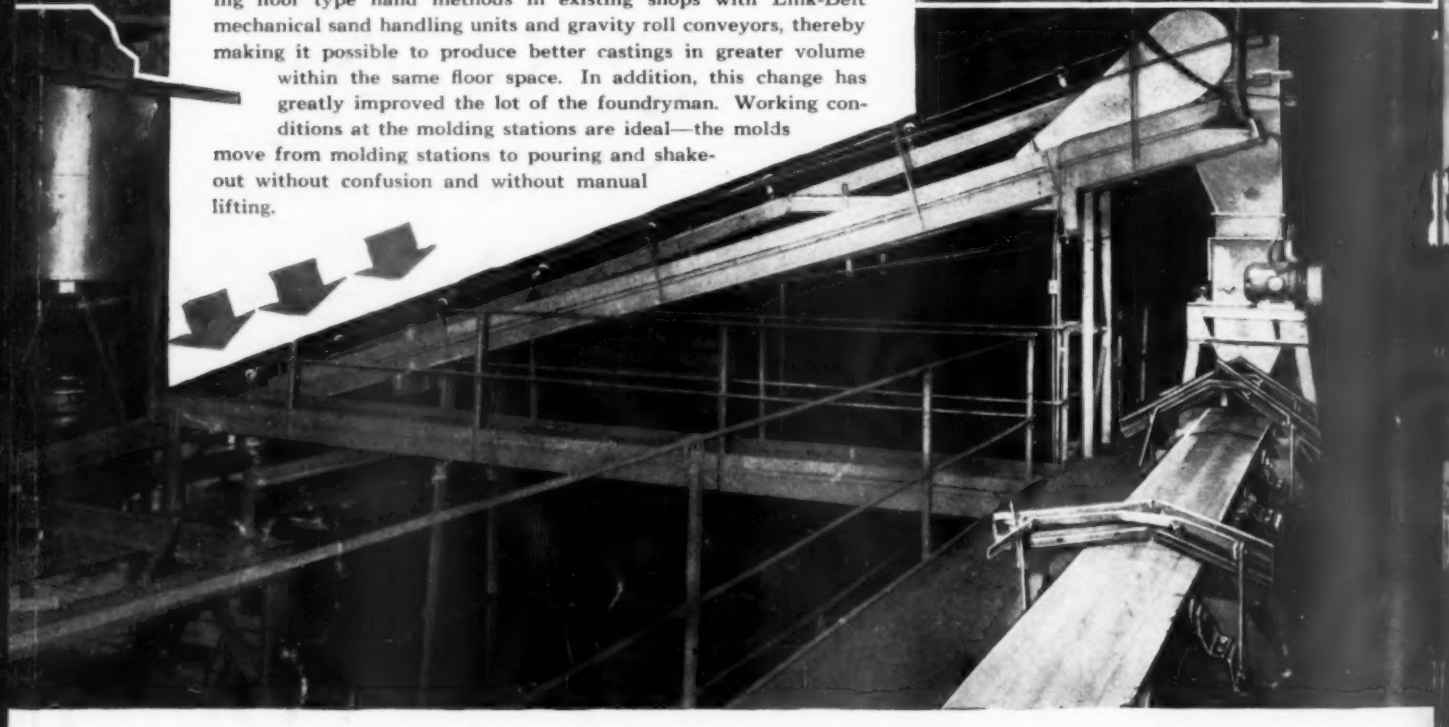
- NEW ENGLAND . . . . . 166-182 Brewery St., New Haven, Conn.
- NEW YORK and PENNSYLVANIA . . . . 93 Stone St., Buffalo, N. Y.
- INDIANA . . . . Hoosier Supply Co., 36 S. Cruse St., Indianapolis, Ind.
- CANADA . . . . FREDERIC B. STEVENS OF CANADA, LIMITED
- 1262 McDougall St. . . . . Windsor, Ontario
- 2368 Dundas St. West . . . . . Toronto, Ontario

For Metal & Mold Handling • Furnace Charging Cranes • Electric Mold Skin Driers

PORT WASHINGTON, WIS
DEPT. 184

# HOW AMERICAN BRAKE SHOE FOUNDRIE STEPPED UP PRODUCTION

This was accomplished, not by building new plants, but by replacing floor type hand methods in existing shops with Link-Belt mechanical sand handling units and gravity roll conveyors, thereby making it possible to produce better castings in greater volume within the same floor space. In addition, this change has greatly improved the lot of the foundryman. Working conditions at the molding stations are ideal—the molds move from molding stations to pouring and shakeout without confusion and without manual lifting.



● At top is a general view of molding floor with molders at each molding machine, sand hoppers and distributing conveyor gallery overhead. Lower illustration shows part of bucket elevator (extreme left), which delivers shakeout sand to a hexagonal rotary screen that breaks up lumps and separates refuse. The screened sand falls into bin shown. A table-feeder under the storage bin delivers new sand from a separate bin together with screened sand to a paddle mixer which uniformly blends both with the addition of water and clay binders. The inclined belt conveyor takes this blended sand to a revivifier which further disintegrates and cools it. From here the sand is distributed to double-compartment molders' hoppers by the belt conveyor in foreground equipped with adjustable discharge plows.

**LINK-BELT COMPANY**

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, San Francisco 24, Toronto 8. Offices, warehouses and distributors in principal cities.

# LINK-BELT CONVEYORS

AND PREPARATION MACHINERY